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The features of this insect survey properly belonging to the Bureau of Entomology,* included the determination of the primary infesting insects, the condition or status of the existing infestations, and the methods and policy of control work which should be employed for their eradication.

Conditions

It has been shown that within the area covered by the survey, the western pine beetle in yellow pine, and the mountain pine beetle in sugar pine are primarily responsible for practically all of the loss recorded.

These species have been known for a number of years, and their habits and the proper methods of controlling have been determined by the Bureau of Entomology.

It has been shown that in general the infestation has been increasing and is classed as epidemic in certain watersheds of the area, while in others the loss constitutes so small a per cent of the stand that the infestation is classed as normal. Briefly the epidemic infestations exist in the watersheds of the San Joaquin, Kings, Kaweah, Tule and Kern Rivers. The watersheds of the Merced, Tuolumne, Stanislaus, Mokelumne and American Rivers are comparatively fee of epidemic infestations.

The following points brought out in the general report are emphasized by this Bureau for their bearing upon contemplated control work within the general area covered by the survey:

1. So far as it is possible to determine the units of infestation outlined by this survey are fairly complete natural units, and may be considered either independently or collectively in prospective control work. Sub-

*Estimates of insect loss as determined by this survey have been made by the Forest Service.

sequent investigations, however, may modify the boundaries of these units.

- 2. It cannot be preducted with any degree of certainty whether the infestation within these units will, during the next two or three years, increase, decrease, or remain about at the point as indicated in 1917. It can be safely predicted that a certain amount of loss will continue in the future as it has in the past and that this loss will include a continual toll upon the best merchantable trees of the forest.
- 3. Stands which are mature or overmature are usually subject to considerable loss and are the most difficult to protect. Lumbering and marketing of such stands would of course ameliorate this condition. Also continued logging operations within an area attract many of the insects to freshly cut trees and tend to prevent the occurrence of epidemics.
- 4. Practically all units involve the holdings of more than one owner, and any control project to be effective must be carried out cooperatively. This may be effected by each owner thoroughly working his own land in conjunction with the others, or by all owners pooling their interests and working the entire area under one organization. In either case agreement upon and adherence to a uniform policy is essential to secure the best results.
- 5. A policy of insect control to be sound must be based not only upon valid economic principles, but also upon reliable biological facts and laws which have been determined by thorough research investigations. Unless forest insect control is carried out in accordance with certain facts in the biology of the insects and the principles governing them, it will very probably do more harm than good.

In view of this situation the Bureau of Entomology makes the following recommendations:

- lst. That control work be carried out on the epidemic areas in order to reduce the infesting insects to a point where their attacks will be held in check by natural agencies.
- 2nd. That a permanent policy of insect control including a certain amount of control work, be maintained on those areas where the infestation is reported as normal for the purpose of preventing the occurrence of destructive outbreaks.

It is considered that in the case of the epidemic areas it is necessary to treat a sufficient percentage of the infestation to reduce the insects to a point where their depredations will be kept at a minimum by the same natural agencies which at present control them on the endemic areas. If a sufficient percentage is properly applied, it is considered that this natural control will be brought about as the result of one season of control work. However, this result will not be accomplished in one season, unless the area covered by initial control work is sufficiently inclusive to prevent reinfestation from adjoining epidemics. For example, if control work is conducted jointly throughout the Sequoia and Sierra National Forests, results will be far more effective than if control work is conducted only on a few widely separated units.

Areas where the infestation is endemic or normal will undoubtedly require a certain amount of attention annually. It is considered that the extermination of the beetles, however desirable on such areas, can only be accomplished at a cost far in excess of the actual value of the timber which would be protected, even considering the loss for a period of 10 to 20 years of endemic infestation. However, the more accessible infested trees can be treated at a moderate cost, and if such work is properly done, the results

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will be of a character to justify the expenditure. These same recommendations will apply to the present epidemic areas if they are successfully controlled and reduced to a normal condition.

November 24, 1917.

Assistant Forest Entomologist.

Area and Volume included in Survey.

This survey included the pine belt on the western flank of the Sierra Nevada Mountains of California from the Rubicon River as far south as the South Fork of the Tule River. Therefore, practically all the private and government owned yellow pine, Jeffrey pine, and sugar pine within the Eldorado, Stanislaus, Sierra, and Sequoia National Forests, and the Yosemite and Sequoia National Parks was covered. This represented a stand of 23½ billion feet, or 18 per cent of the private and government owned timber in California.

Cost of 1917 Survey and Estimate of Cost for Completing the State.

Including both the field expenses and the salaries of all the men engaged on the survey, the 1917 survey cost was \$3200. Using this figure as a basis, the remainder of the pine timber of the state can be similarly covered at a cost of \$13000, about \$7000 of which consists of estimated field expenses. If only field expenses are to be paid by the cooperators, it will be necessary to secure about \$3500 from private owners for the examination of their lands.

Arount and Distribution of the Insect Loss.

Over 19 billion feet of the pine timber of the survey area have been divided into 65 so-called control units which will be used in the formulation of an insect control policy. About 40 per cent of this pine timber is suffering from epidemic infestation, four-fifths of this epidemic loss being in timber which is both commercial and accessible and confined to 26 control units with a total acreage of 349,000 acres. In 1917 this

*The Bureau of Entomology has prepared a separate brief sunmary of the strictly entomological phases of the survey.

epidemic loss averaged less than one-half of one per cent of the total stand, although on certain areas it was as high as one per cent. These 7 losses were proportionately as great in the private timber as in the government holdings. About three-fourths of the total insect loss on the whole survey area is confined to the epidemic infestations which by area constitute less than one-third of the survey area. These epidemics are confined to the watersheds of the San Joaquin, Kings, Kaweah, Tule, and Kern Rivers.

Approximately 60% of the pine timber within the control units contained only normal infestation, in which the 1917 loss was usually not more than one-tenth of one per cent of the total stand.

Value of the 1917 Insect Loss.

Assuming an average value of \$2.25 per M for the sugar pine and yellow pine combined, the 1917 insect loss in the epidemics in the commercial timber amounts to \$23,000 on National Forest lands, and \$15,000 in the private holdings. The 1917 epidemic loss in the Sequoia National Park approximates \$4000, no epidemic losses now occurring in the yellow pine or sugar pine on the Yosemite National Park. The 1917 loss on the survey area as a whole, including both epidemic and endemic areas, private and government lands, approximates \$60,000.

Control Measures.

To control the 1917 epidemic infestations in the commercial pine timber on the survey area, in accordance with the methods advocated by the Bureau of Entomology, will cost from \$30,000 to 40,000 on the government holdings, and from \$15,000 to \$20,000 on the private lands.

The complete working of all the epidemics of the survey area in a single year will yield by far the best control results, but such a procedure involves the difficulty of efficiently handling control work over such a large area with a limited number of men of requisite experience.

Limitations on the Data.

From year to year there is quite apt to be some fluctuation in the amount of the infestation on the 1917 survey area. As a consequence, a change of insect conditions within the next few years and a delay in the inauguration of the recommended control work will necessitate corresponding changes in the estimated cost of control measures.

The field work of this survey was conducted cooperatively between the Bureau of Entomology and the Forest Service, by methods approved by the Bureau of Entomology. The Forest Service takes the responsibility for the field work of its own men, and a similar responsibility is assumed by the Bureau of Entomology for the field work of its men. However, in accordance with Dr. Hopkins' plans for the survey, the Forest Service is entirely responsible for the compilation and interpretation of the loss and timber stand data, but the methods employed in this feature of the work were only those which had my approval.

The report has been worked up, therefore, with a definite understanding in regard to the fixed lines of responsibility between these two branches of the Department of Agriculture, the division following the instructions of Dr. A. D. Hopkins to me, in his two letters of May 6, 1917. In accordance with these instructions, I assume the responsibility for Sections 2, 3, 4, 6 and 7, while the responsibility for the remainder of the report rests with Messrs. Ralph Hopping and A. J. Jaenicke of the Forest Service. With the responsibility for the various sections definitely fixed, in this manner, it was thought desirable to include both the Bureau of Entomology and the Forest Service data under one heading so that all of the results of the survey could appear as a unified whole.

November 14, 1917.

Assistant Forest Entomologist.
Bureau of Entomology.

HISTORY AND COST OF THE SURVEY, INCLUDING AN ESTIMATE FOR COMPLETING THE STATE.

On January 20, 1917, a telegram signed by the White & Friant
Lumber Co., Yosemite Lumber Co., and Madera Sugar Pine Co., was addressed
to the Secretary of Agriculture, requesting an immediate investigation of
the extent and seriousness of the loss caused by bark beetles, and recommending an emergency appropriation of \$50,000 to carry out the necessary
control work. This was followed by a letter from the California Forest
Fire Protective Association requesting similar action.

In response to these requests a general survey of conditions throughout the pine forest of California was proposed by the Department of Agriculture; this survey to be carried out cooperatively by the private lumber companies, the Forest Service, the National Parks, and the Bureau of Entomology. An informal organization was contemplated, the general supervision of the work so far as necessary to be vested in the Bureau of Entomology through the Forest Insect Field Station at Ashland, Oregon.

Careful consideration of the area to be covered led to the conclusion that it would be impossible to cover the entire sugar and yellow pine acreage in California in the 1917 field season, primarily because it would necessitate the employment of more trained men with the necessary experience than were available in both the Bureau of Entomology and the Forest Service. It seemed easiest to get the cooperation of the private owners for that pine timber in the state situated south of the Rubicon River on the Eldorado National Forest, through the Stanislaus and Sierra National Forests, and as far south as the Tule Indian Reservation on the Sequoia National Forest. This then was the area covered by the 1917 field work.

After these preliminaries, it became evident that what was wanted in the private owners and the government in this insect survey was data on the following points in particular:

- 1. Amount of insect damage to sugar and yellow pine both on government and private land.
- 2. The danger to which the green pine timber was subject because of these depredations.
- 3. The feasibility of preventing a part or all of similar losses in the future by control work.
- 4. The probable cost to the government and private owners to institute an effective insect control policy.

The prompt manner in which the White and Friant Lumber Company, the Yosemite Lumber Company, the Madera Sugar Pine Company, and the California Forest Fire Protective Association met the efforts of the Department of Agriculture to get this survey under way, made it possible to perform the work during the 1917 field season in the pine region south of the Rubicon River. Particular credit is due the White and Friant Lumber Company for their active cooperation, both in the office and in the field.

The following companies cooperated in this survey:

Fresno Flume and Lumber Company
Madera Sugar Pine Company
California Door Company
Whiteside Lumber Company
Blodgett Lumber Company
Sanger Lumber Company
James Ducey
Westside Lumber Company
White and Friant Lumber Company
Yosemite Lumber Company.

With two notable exceptions the above list includes all of the large timber owners in the survey area. The last three companies on this list cooperated to the extent of several hundred dollars by furnishing subsistence and transportation to the field men while their lands were being examined. A considerable portion of the timber covered in the survey was in the form of scattered small holdings. This timber was cruised under Forest Service ex-

pense. The following table indicates the allotments and the deposits made for the field expenses of the survey. The large balance in the deposits made by the private owners is due to the fact that a number of the companies furnished a part or all of the subsistence and travelling expenses of the examiners, and thus but little had to be deducted from their deposits.

Table 1.
Field Expenses of the Survey.

Cooperator	Deposit	Amt. Spent	Balance.
Private Owner.	522.80	178.74	344.06
National Parks.	139.00	136.50	2.50
Forest Service.	1200.00	1200.00*	C
Total	1861.60	1515.24	346.56

In order to get a true statement of the field expenses of the survey almost \$400 must be added to cover the value of subsistence and transportation furnished by cooperating companies. Thus the field expenses of the survey approximate \$1900. The salaries of the men engaged on the field work amount to \$1300. The cost of the field work of the survey has therefore been approximate by \$3200.

Over 19 billion feet of pine timber was covered in the survey, distributed over an acreage of 1,662,000 acres. This survey has therefore cost 16 cents per million feet of pine timber (salaries and expenses) and about two-tenths of one cent per acre. It is believed that in any future survey comparable in extent to the one just completed, that these cost figures can be lowered at least 15 percent. The fact that the work was quite new to some of the men, and that two of the men were drafted into military service soon after the work began, tended somewhat to raise the costs above what they would normally be.

In addition to the 19,300,000.000 feet of pine timber covered in the survey, estimates of insect loss were possible on over 4,000,000,000

^{*} Slightly more than this amount expended.

commercial pine timber. This total of $23\frac{1}{2}$ billion represents 18* per cent of the government and privately owned pine timber in California. Using these figures as a basis, and assuming a survey cost 10% less than that of the 1917 survey, the remainder of the pine timber in the state of California both government and private, can be covered at a cost of approximately \$13000, of which about \$7000 will be field expenses, the remaining \$6000 being the cost of salaries. At least 50% of the pine timber still to be covered is privately owned. If the entire salary expense is borne by the government, as was the case in the 1917 survey, cooperation to the extent of at least \$3500 will have to be secured from the private owners to cover the field expenses for the survey of their lands.

^{*}Bulletin 440, "Lumbering in the Sugar and Yellow Pine Region of California.

Section 2.

ORGANIZATION OF THE WORK.

The survey was planned as a cooperative project between the private lumber companies, the Forest Service, the Department of the Interior and the Bureau of Entomology upon the following basis:

- 1- The Bureau of Entomology and the Forest Scrvice to detail all available men with sufficient training to carry out the field examinations.
 - 2- The salaries of these men to be paid by their respective Branches.
- 3- The expenses incurred in the field work to be apportioned according to ownership.

A definite organization was originally contemplated but lowing to the limited time available for starting the field work and the delay involved in securing formal agreements, it was finally decided to carry the survey through as well as possible on the basis of informal expressions of support secured from the interested owners.

The following men were detailed on the field work.

Ralph Hopping
A. J. Jaenicke
H. A. Smith

J. M. Miller
W. E. Glendenning
J. E. Patterson
Albert Wagner
F. P. Keen

The entire area of the survey was arbitrarily divided into 12 districts and definite assignments were made to each member of the survey with specific instructions as to procedure.

During the progress of the work Mr. Smith was drafted and Mr. F. P. Keen enlisted in the army which necessitated a general rearrangement of plans and delay in completing the work.

METHODS OF FIELD WORK.

In as much as the main purpose of the survey was to determine quantitatively the amount of insect damage to the pine timber on the areas, and to obtain information on the character of the infestation responsible for this loss, it was necessary to employ a systematic method of insect reconnaissance as a basis for the loss estimates. In addition, it was necessary to find out what the primary infesting insects were.

In view of the fact that a large area had to be covered in a limited length of time with but a handful of men, it was necessary to adopt an extensive method of insect reconnaissance. The method used had been tried out a year or two earlier by the Forest Insect Field Station of the Bureau of Entomology at Ashland, Oregon, on an area of over 300,000 acres of yellow pine timber in southern Oregon. In this test it was demonstrated that it was possible to get data, sufficiently accurate for all preliminary purposes, on insect loss on large areas at a relatively low cost. This method of extensive insect reconnaissance, as developed by the Ashland Station and as adopted in this survey, consists, in brief of the following:

Topographic viewing of the area: The estimator gridirons the area by travelling along the prominent points and ridges, and from these counts the visible insect-killed trees within a distance of not more than two miles. These trees are spotted on a map. In as much as only those insect-killed trees retaining part or all of their foliage can be seen at a distance, only these are considered in the counts and in the spotting on the map. Usually therefore, the trees counted and marked on the map represent a portion of only that loss which has occurred within two or three years. It is usually possible within a distance of two miles, and with the aid of field glasses, to distinguish between yellow pine and sugar pine. In order, however, to

determine what percentage of the killed trees are not seen at all, the average size of these trees, and the percentage of them which have been killed in each of the last two or three years, the estimator resorts from time to time to so-called intensive plots which will be described in the next paragraph.

Cruising on intensive plots. In the extensive work, it is not possible to get any data on the proportion of the trees killed in the individual years represented by the insect-killed trees counted, nor their average size, nor any accurate idea as to what proportion of the insect-killed trees actually existing on an area covered by the extensive method are not seen at all by the estimator. It is evident that a considerable number of the recently killed trees will not be discovered by the cruiser no matter how careful he may be because of their being hidden by surrounding green trees or because they are cut off from the range of vision by topographic depressions and ridges. To supply all these data, an intensive cruise is made from time to time of sample plots not less than 1000 acres in extent. These plots are chosen so as to be representative of the infestation and timber conditions on the extensively covered areas around it. In as much as the cruiser covers his sample plot extensively first and then intensively he at once gets a relation between the insect-killed trees he is able to see by "topographic viewing" and those actually existing on his sample plot. Thus he may see only 10 insect-killed trees when he covers the plot extensively. and finds 30 such trees when he intensively covers it. If he has properly chosen his plot, he can then safely multiply his counts by three on that large area of which his plot is representative, and which he has covered only by topographic viewing. In as much as each insect-killed tree encountered in the sample plot is carefully studied, the estimator is able to obtain data on diameter, volume, proportion of trees killed in each of two or three years, etc.-which he can then apply to that portion of his

timber which he has cruised extensively. From the trees studied on these sample plots, the estimator also determines the primary infesting insects; or, as may sometimes be the case, whether insects or other causes are primarily responsible for the death of the tree. Even in his extensive work the cruiser is apt from time to time to get close enough to insect-killed trees so that he can use data from these to supplement what he obtains on his carefully chosen sample plots.

The field method used, therefore, in this survey consists of extensive cruising supplemented by sample plots from time to time which furnish the necessary data for the proper interpretation and significance of the counts obtained in the extensive cruises. While every effort was made in the progress of the field work to cover the entire area of the survey by the same uniform method and to leave as little as possible to the judgement of the estimator, there are very evident limits to the accuracy of the data. Thus poor light and unfavorable topography may interfere with a reasonable efficiency in the counting of the trees. Then again the sample plots chosen may not be representative of the infestation in the area around it. Further, the number of trees actually studied on the sample plots may be insufficient for the accurate determination of average volumes and the proper proportioning of the insect loss between the two or three years included in the loss period. Then there is the personal equation. estimator may fail to do careful and thorough work, or possess an inherent tendency to overestimate or under estimate. However, it has been found in checks made in previous work that the results obtained on an area by this extensive method ordinarily do not vary more than 25% from the data obtained by an intensive cruise of the same area. It is perfectly safe to assume that the area of the survey has been covered in such a way that no large or important unit of infestation has been overlooked, and that the

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results show, within a maximum error of 50%, the actual amount of loss due to insects.

With the above limitations in accuracy, therefore, the field work of the survey resulted in the collection of the following data:

- 1. A base map showing the area covered, routes of travel, location of all insect-killed trees actually seem, location of sample plots and the division of the area into units of infestation or control units.
- 2. A count of all fading, sorrel and red-topped trees seen on the area in the course of the topographic viewing or the extensive work.
- 3. Detailed maps of the check areas or sample plots, together with full data on the individual insect-killed trees. (These data are subsequently used in the office compilation for the determination of the percentage of trees actually seen in the extensive work, average volumes, etc.)

As was indicated in the preliminary statement, the Forest Service has been responsible for the working up of these data, although the methods followed were worked out jointly by Mr. J. M. Miller of the Bureau of Entomology and Messrs. Hopping and Jaenicke of the Forest Service. The compilation of these data consisted primarily of the following:

- 1. Placing the 65 infestation units, into which the survey area was divided, on the proper maps together with the infestation on these units.

 (By Mr. J. E. Patterson of the Bureau of Entomology.)
- 2. Working out the yellow pine and sugar pine stand on each of these units, the area of each unit, and dividing it according to ownership.
 - 3. Estimating the 1917 insect loss on each of these units.
- 4. Forecasting the cost of control of the epidemics in the commercial timber, both that which is accessible and that which is inaccessible, using as a basis the 1917 spring loss in computing these costs.

On the blue print maps which have been prepared, the boundaries of the 65 infestation units on the four National Forests (Eldorado, Stanislaus, Sierra and Sequoia), together with adjacent National Park lands, are shown. Within these units, the insect-killed sugar pine and yellow pine trees which were actually seen by the estimator are also shown. These trees represent only from 1/6 to 3/4 of the trees killed in 1916 and 1917 on these areas: the exact ratio for each unit will be found on the individual unit sheets bound in a separate report called "Summary of the Data on the Infestation Units."*

^{*} S, Insect Control, Survey. October, 1917.

To obtain the stands of pine timber on the individual units and divide it by ownership, full use was made of all available reconnaissance data. Various members of the Office of Silviculture in San Francisco assisted in the estimates for those units for which no reconnaissance data were available.

In the extensive work of the survey, data were obtained on the insect loss during the two year period 1916 and 1917. By the aid of the results from the intensive plots it was possible to determine with reasonable accuracy what proportion of this two year loss could be charged against 1917. Since the survey was carried on during the spring and summer months. the 1917 loss computed from the survey data did not include the fall loss. To get, therefore, the complete 1917 loss it was necessary to add a certain amount to the spring 1917 figures. Past experience has shown that to estimate the fall loss to be 25% of the spring infestation is quite conservative for the yellow pine in California. The 1917 loss figures, therefore, as computed for the yellow pine, and as given later in this report, make due allowance for the fall loss. The same method was followed in getting the sugar pine loss on the Sierra and Sequoia. Because of the fact that in a number of cases on the Eldorado and the Stanislaus it was observed that the mountain pine beetle required two years to kill the sugar pine, it was assumed that the estimator's 1917 loss figures on this species represent the 1917 loss completely.

In making estimates of control costs, it is manifestly impossible to base it on anything but the 1917 spring loss. From year to year this loss on an individual unit is subject to much fluctuation, but it is felt that the costs for the survey area as a whole will remain fairly constant for a year or two at least. A part of the insect loss is in the form of epidemics, and the rest results from so-called endemic attacks. The

epidemic loss was divided into that which occurred in timber which was both commercial and accessible, and that which occurred in timber which was commercial but not accessible. The control costs were computed separately for these two classes of timber. Thus far in the insect control work of Californis the control of endemic infestations, has never been recommended by the Bureau of Entomology for specific projects, but the cost of eliminating the loss in this class of infestation on the entire survey area has also been computed. Because of the high cost of labor, and the increased costs in equipment and subsistence supplies, it was believed necessary to place control costs in the epidemic areas on the basis of \$4.00 per M feet of timber treated, and \$8.00 per M for the endemic infestations.

either involved in or subject to insect epidemics have been segregated into smaller areas called infestation units. These vary in size from a few thousand acres to almost 100,000 acres. On the survey there are 65 of these units with an average area of 26,000 acres. By including within these units all the pine timber involved in or subject to insect damage, practically all the commercial stands of pine timber on the four National Forests and the Yosemite and Sequoia National Parks are thrown within these 65 infestation units. Only those pine stands of poor quality occuring at the highest and the lowest elevation, and those large areas in which sugar and yellow pine constitute but a small percentage of the stand, are outside the infestation units.

The infestation unit as it has been employed in this survey is an area in which it is assumed that the infestation is neither influenced by or influences the infestation in nearby or adjacent areas. In other words, each of the 65 units is a control unit, on any one of which control measures can be instituted without any reference to the conditions on the other units. Whether or not these infestation units are as independent of each other as it is hoped they are, is not a matter of entire certainty. At any rate, these divisions are justified in that they will facilitate the working out of an insect control policy on the large pine area which they cover.

The different infestation units are divided from each other mainly by type barriers. In the case of those units on the Sierra and Sequoia National Forests, these type barriers are definite and are believed to be sufficiently effective to prevent the infestation on one unit to affect

that on any other. In addition to separation from each other as a result of a change in type of timber, some of the units are separated from each other also by high ridges or deep canyons. However, the topographic barrier does not seem an effective one when there is not any big break in the continuity of the pine timber accompanying it. It is because of this effectiveness of the type barrier between the units on the Sierra and Sequoia National Forests and the Sequoia National Park that it is believed that the epidemic infestations on these two Forests offer the best possible field for investigative work on insect control measures. On the Stanislaus and Eldorado National Forests the pine timber lies in large bodies, and is not separated often into smaller areas by any changes in type. Occasionally brush areas and fir timber do break up the continuity of the large timber bodies but rarely are these breaks of sufficient extent to be effective boundaries for control units. Consequently, on these Forests, deep canyons and high ridges separate the exceedingly large units from one another. As a result, the 25 control units on the Eldorado and Stanislaus are not nearly as definitely isolated from each other as the 40 infestation units on the Sequoia and Sierra Forests, and the Sequoia National Park.

PRIMARY INSECTS TO BE CONSIDERED.

Three species of bark beetles are primarily responsible for the loss recorded in the yellow pine, Jeffrey pine, and sugar pine on the survey area*. These insects, their habits, and methods of controlling them are fully described in publications of the Bureau of Intomology.** All three species belong to the Genus Dendroctonus, and are:

The Western Pine Beetle, (Dendroctonus brevicomis Lec.). This insect was found only in yellow pine, (Pinus ponderosa). Its damage was most pronounced in the lower elevations of the pine belt, although it was found attacking the very best yellow pine stands up to an elevation of 6000 feet.

Occasionally, this insect was also epidemic in the small pole stands at lower elevations.

The Mountain Pine Beetle, (Dendroctonus monticolae Hopk.). In the survey area, this insect was confined almost altogether to the sugar pine, and only an occasional yellow pine was found to be infested by it. This barkbeetle is responsible for practically all of the sugar pine loss recorded in the survey. It prefers to attack the large mature trees, thus causing the loss of the very best quality of sugar pine. Frequently only the tops of the trees are attacked the first year., the final killing of the tree taking place during the next season. This was particularly the case on the Eldorado and Stanislaus National Forests.

The Jeffrey Pine Beetle, (<u>Dendroctonus jeffreyi</u> Hopk.). The timber losses due to this insect were restricted to the Jeffrey pine at elevations from 6000 to 8000 feet. Epidemic infestations were met with in the extensive Jeffrey pine stands east of the great western divide of the Sierras.

One of the engraver beetles, (Ips oregoni) and a flatheaded borer (Melanophila gentilis) were found to do only a miner amount of damage.

^{*} This information is taken from the field records of the men engaged on the survey, and is verified by the Pacific Slope Station at Ashland, Oregon.

**Particularly in Bulletin 83, Part I, Bureau of Entomology.

"Bark Beetles of the Genus Dendroctonus". By Dr. A. D. Hopkins.

CHARACTER AND DISTRIBUTION OF THE INFESTATION.

In the survey area, both epidemic and normal infestations were found to occur. These two terms have been in use for some years in discussing the character of infestation without very definite significance. Epidemic infestations are those in which the insects are killing healthy trees, both in groups and singly, usually exceeding annually a certain percentage of the stand, such as one-tenth of one percent of the timber. Normal or endemic infestations are those in which the insect attacks are usually confined to unhealthy, lightning-struck or injured trees, although occasional healthy trees may be killed in an endemic or normal infestation the loss is rarely in excess of one-tenth of one percent of the stand. Epidemics and normal infestation may be classified into increasing, decreasing and balanced. By "balanced" is meant the condition of an infestation in which the loss due to it has remained fairly stationary during the past few years.

It was, however, difficult in a few cases to decide whether or not the insect losses should be considered epidemic or whether they are normal. In any case, even in the heaviest infestation found in the whole survey hardly more than one percent of the pine stand is being killed by insects each year. In this respect, the western pine beetle attacks in yellow pine and the mountain pine beetle depredations in sugar pine in California are distinctly different, for instance, from the mountain pine beetle losses in the ledgepole of California where a whole lodgepole stand may be wiped out in a few years, or the workings of the mountain pine beetle beetle in the mixed lodgepole -

*The definition of these terms is applicable only to the western pine beetle attacks in yellow pine, the mountain pine beetle infestations in sugar pine and the Jeffrey pine beetle damage in Jeffrey pine in California. yellow pine stands of Montana, where a considerable percentage of both the 26 yellow pine and the lodgepole are lost in five or six years. Although only a small percentage of the yellow pine and sugar pine of California is insect killed each year even in the heaviest epidemics, this loss goes on quite regularity for a number of years and before the infestation finally resumes a normal status, a good deal of timber has been killed. Further, the loss in epidemic attacks is to a considerable extent in the finest timber.

In as much as control work is confined largely to timber which is both commercial and accessible and in which there will probably be utilization within a few decades, these insect losses, although they do not involve annually any considerable portion of the stand, do represent an actual decrease in the amount of the better quality of stumpage available at the time of logging operations. This then is the main justification for insect control measures in the commercial and accessible pine stands of California.

With three exceptions (Patterson Mountain, Jose Basin and Willow Creek units on the Sierra N.F.), the 40 infestation units within the Sierra and Sequoia National Forests and the Sequoia National Park are considered to be of an epidemic nature and yet the 1917 insect loss in the pine timber within the infestation units on the Sequoia averages only three-tenths of one percent of the pine timber within these units, while on the Sierra the 1917 loss is two-tenths of one percent. It must be said, however, that there are individual units in which the 1917 loss approximates one percent.

Of the 25 control units on the Eldorado and Stanislaus National Forests, and the Yosemite National Park, only 3 contain 1917 infestation which represents an increase over the loss in the few years preceding, and even this increase is practically negligible. On 7 of the units, there has been a decrease, and on 14 of them the 1917 condition was a balanced one.

One unit is in the doubtful column. In as much as the insect attacks on all

25 of these units are considered normal, the increases or decreases were hardly discernible.

Briefly, then, epidemics of the western pine beetle in the yellow pine are present and are increasing in the watersheds of the San Joaquin, Kings, Kawaah and the Tule Rivers. In the Merced, Tuolumne, Stanislaus, Mokelumne, and American River drainage basins, epidemics of this insect have occurred in the past decade, but at present they can no longer be considered as being in an epidemic status. (This is especially true of the areas between the Merced and Tuolumne Rivers where the White and Friant Lumber Company, the Yosemite Lumber Company, the Forest Service, and the Yosemite National Park cooperatively carried on control work during the seasons of 1914, 1915, and 1916.

Epidemics of the mountain pine beetle in the sugar pine are not so marked as those of the vestern pine beetle, but this insect was found to do an increasing amount of damage in the same watersheds in which western pine beetle epidemics now exist. In certain areas between the Merced and Tuolumme Rivers the mountain pine beetle in the sugar pine has decreased to a minimum. This is also true of the sugar pine infestation in the American River watershed in Eldorado County.

The Jeffrey pine beetle was found in an epidemic condition only in the watersheds of the Kern River. A considerable portion of the Jeffrey pine on the survey area occurs at the higher elevations in stands which are neither connercial or accessible. The loss figures given for yellow pine in a subsequent section of this report include the Jeffrey pine insect losses.

All of the 25 control units within the Eldorado and Stanislaus National Forests, and the Yosemite National Park, are put in the normal infestation class, and on these areas the 1917 insect loss is considerably less than one-tenth of one per cent of the pine stand. The difference between the character of the

infestation in these so-called normal areas and the epidemic stands on the Sierra National Forest, the Sequoia National Forest and Sequoia National Park, is exceedingly evident on the ground. The 1917 loss on the epidemic areas of the survey averages three times that on the normal areas. This difference between the amount of annual loss is not the only one which differentiates epidemic infestation from normal attacks on this survey area. In the case of the epidemics the loss is confined to a considerable extent to the finest pine timber, while in the endemic areas the loss is to a greater degree in pine trees of an average or even inferior grade.

The 65 control units on the survey have also been classified according to whether the infestation on them is increasing, decreasing, or balanced.*

In connection with this classification it should be remembered that it applies only to the 1917 condition. The present status of any of these infestations may only be of a temporary nature, in as much as 1918 may bring important changes in some of these units.

The term "balanced" has been applied not only to epidemics but to normal infestation, for even the latter are subject to considerable fluctuation. When "balanced", as used here, is applied to an infestation it is not meant that controlling factors have made the infestation "safe". For instance, in 1918 some of the units in the "balanced" class may go either into the "decreasing" or "increasing" group.

Of the 19 infestation units on the Sequoia National Forest, and Sequoia National Park, 13 of them contain 1917 infestation which represents an increase over 1916 conditions, while on 6 the attacks are balanced. Of the 21 units on the Sierra, 9 are increasing, 2 are decreasing, 8 are balanced on one unit control work was done this year, and on one unit the exact condition to uncertain.

^{*}See individual unit reports in "Summary of Data on Infestation Units." S, Insect Control, Survey. October, 1917.

AREA, VOLUME, OWNERSHIP AND VALUES OF TIMBER INCLUDED IN SURVEY.

In as much as in this survey it was planned to get data on insect loss only in yellow pine, Jeffrey pine, and sugar pine, only those portions of the National Forests and private holdings containing commercial stands of these species were covered in the survey. Briefly, these areas were:

- 1. Government lands
 - s. Eldorado. Stanislaus, Sierra and Sequoia National Forests.
 - b. Practically all of the Yosemite, Sequois and General Grant National Parks.
- 2. Private lands.
 - a. Holdings within the above named National Forests.
 - b. Timber lands outside the Forest Boundaries which were portions of infestation units partially within the Forest boundaries.

As a result of this survey it was possible to divide the pine timber into 65 fairly distinct infestation units varying in size from 2240 to 98,000 acres. In most cases these units are separated from each other either by type or topographic barriers, and frequently both. The units in the Sierra and Sequoia Forests are especially definite, and are almost ideal for use as future control units. These units do not, however, include all of the pine timber within or adjacent to the National Forests and National Parks mentioned in the preceding paragraph, but are restricted to the better and more commercial stands of timber. Yellow pine and sugar pine occurs on large areas in only small quantities. Such pine timber was not actually covered in the survey but with the insect loss data obtained from the cruised areas, it was possible to quite accurately estimate the insect damage in this scattered pine timber, although it is quite probable that control measures will never be considered desirable in stands containing such a low percentage of pine.

The total area included in the survey, private and government,

together with the stand of pine timber on these 65 infestation units is as follows:

Table 2.

Acreage and Stands of Timber within Infestation Units.

Forest	Acreage in infest- ation units.	Yellow Pine in M.B.M.***	Sugar Pine	Total Pine Timber M.B.M.
Eldorado	385.000	2_926_000	1.011.000	3.937.000
Stanislaus*	719.000	4,557,000	2.411.000	6.968.000
Sierra	316.000	3.183.000	2.240.500	5.423.500
Seauoia**	262,600	2,082,980	895,520	2,978.500
Totals	1.682,600	12,748,980	6.558.020	19.307.000

^{*}Figures include part of the Yosemite National Park.

The 1,682,600 acres of surveyed pine timber are distributed according to ownership as follows:

Table 3.

Ownership of Area within Survey.

Ownership	Acres	Per cent of Total
National Forests	918,100	55%
National Parks	158,000	9%
Private	606.500	36%

The relatively high percentage of private land included in the infestation units indicates the importance of cooperation from timber companies
in the carrying out of any effective insect control policy on the four
National Forests and the National Parks included in this survey. This is par-

^{**}Figures include part of the Sequoia National Park and all of General Grant Park.

^{***}Figures include Jeffrey pine.

ever, the infestation is fortunately not a serious menace to the timber at the present time. The following table shows the percentage of ownership of the lands within the infestation units by National Forests and National Parks. The table brings out the high percentage of privately owned timber and within the Eldorado and Stanislaus National Forests.

Table 4.

Ownership Percentage by Forests.

Porest	National Forest Lands.	National Park Lands.	Private Ownership.	Total Total Acreage.
Eldorado	51%	0	49%	385_000
Stanislaus'	50%	9%	41%	719,000
Sierra	67%	8%	25%	316,000
Sequola**	58%	26%	16%	262,600

As has already been indicated the 1,682,600 acresscovered by the survey are divided into 65 so-called infestation units. The number of units within the various National Forests and adjacent National Parks are shown in the following table, together with the average size of these units:

Distribution and Average Acreages of the Control Units.

Forest	Number of Units	Average Acreage per Unit (Approximates)	Total Acreage of Units.
Eldorado	12	32,000	385.000
Stanislaus	13	55.000	719.000
Sierra	21	15,000	316.000
Seguoia	19	14,000	262,600
Total	65	26,000	1.682.600

^{*}Includes portion of Yosemite National Park.

^{**}Includes part of the Sequoia National Park.

exceedingly large when compared with those on the Sierra and Sequoia.

Not only is this true, but the boundaries, both topographic and type, are not nearly as definite and effective as those which separate the Sierra and Sequoia units. In connection with these average acreages it is interesting to compare them with the acreages included in some of the California control projects. These figures indicate that it is perfectly feasible to complete the working of any infestation unit within the Sierra and Sequoia National Forests or the National Park areas within one year, should control work be inaugurated on any of them.

Acreages of some Forest Service and COoperative Control Projects in California.

Table 6.

Name of Project	Acreage
Goodyear	31,000
Hayfork	45.000
Seiad	14.000
Oraggy	22,500
Barkhouse	16.500
Bullock	14,000
Contour	18.000
Oniquito	12,000
Average	21.500

The ownership of the pine timber included in the infestation units is divided in the following manner: The sugar pine, Jeffrey Pine, and yellow pine figures have been combined.

Table 7.

Ownership of Pine Timber included in the Infestation Units.

Forest	Forest Service	National Parks	Private M.B.M.	Total
Eldorado	1.171.000	0	2.766.000	3.937.000
Stanislans	2.472.000	468,000	3.088.000	6.968.000
Sierra	3.123.000	261.500	2.039.000	5,423,500
Sequoia	1.602.890	774.350	401.260	2.978.500
Totals	9.568.890	1.503.850	8.234.260	19.307.000

The ownership of these 19 billion feet of pine timber included in the infestation units is, by percentage, divided as follows:

Forest Service	497	5
National Parks	8,	5
Private	437	6

Outside of the infestation units and within the boundaries of the Eldorado, Stanislaus, Sierra, and Sequoia National Forests there are 4 billion additional board feet of pine timber. The greater percentage of this is National Forest timber. For the most part this timber is scattered over large areas in mixed stands and in exceedingly inaccessible places. Because of these conditions this timber can be safely disregarded in the formulation of an insect control policy for the region. However, it was possible to quite accurately estimate the annual insect loss on this scattered timber by using the data obtained on the 19 billion feet of pine timber included in the infestation units.

The 232 billion board feat of pine timber in California on which

estimates on insect losses have been obtained as a result of this [34] survey represent 18* per cent of the private and National Forest timber within the state.

^{*} On Page 2 of Bulletin 446 "Lumbering in the Sugar and Yellow Pine Region of California", the total stand of private and National Forest sugar and yellow pine is estimated at approximately 131 billion feet.

YELLOW PINE AND SUGAR PINE LOSSES DUE TO INSECTS*.

As has already been shown in the previous section of this report, all of the epidemic losses are confined to the Sierra and Sequoia National Forests, and the Sequoia National Park. In fact, of the 40 infestation units only three are not involved in epidemic infestation at the present time.

These are the Patterson Mountain, Jose Basin, and Millow Creek units on the Sierra. All 25 control units on the Eldorado and Stanislaus National Forest and the Yosemite National Park contained only normal or endemic infestation at the time of the 1917 survey, the average 1917 insect loss in the pine stands of these areas being considerably less than one-tenth of one per cent of the pine timber.

Of the 65 infestation units in the survey area, 28 contain only normal infestation, the other 37 units were suffering in 1917 from epidemic attacks. These 37 epidemic units have been divided into two classes, those in which the timber is both commercial and accessible and those in which the timber is commercial but not accessible at the present time. The results of this classification are as follows:-

Epidemic

Commercial & accessible	26
Commercial but not accessible	11
Normal (both classes of timber)	28
Total number of infestation units	65

^{*} In every case the Jeffrey pine figures are included with the yellow pine losses.

Each infestation unit has been given both a definite number and a name. For the location of the units given in the following tabulation, reference is made to the four blue print infestation maps accompanying this report. For more detailed data on the individual units, such as stands of timber, ownership, insect losses, average volume of the insect-killed trees, a bound copy of the report entitled "Summary of the Data on the Infestation Units" is attached.

Table 8.
Classification of the Infestation Units.

Forest	Epidemic Accessible	Infestation Inaccessible	Normal In- festation	Total
Sequoia*	4,6,8 and 10-16 inc.	1,2,3,5,7,9,17, 18, and 19.	0	19
Sierra	20-26 inc. 29.31-38 inc.	27 and 28	20A,222A and 30	21
** Stanislans	0	0	39-51 inc.	13
Eldorado	0	0	52-63 inc.	12
Total	26	11	28	65

In the table about to be given the total screages in each of the three classes of infestation units on the four National Forests and the two National Parks included in this survey are given. These figures show that 513,500 acres, or 30 per cent of the area covered by the survey, is at the present time involved in epidemic infestation. Over 60 per cent (348,600) acres) of this epidemic infestation is in commercial and accessible timber. All of the epidemic attacks are at present confined to the Sierra and Sequoia National Forests, and the Sequoia National Park.

^{*} Includes Sequoia National Park.

^{**}Includes Yosemite National Park

Acreages of the Epidemic and Normal Infestation.

National	Epidemic Infestation (Acres)		Normal	Total	
Forest	Commercial and Access-	Commercial	Infestation (Acres)	(Acres)	
Eldorado	0	0	385,000	385,000	
Stanislans*	0	0 _	719.000	719.000	
Sierra	222.100	28,800	65,100	316.000	
Sequoia**	126,500	136,100	0	262,600	
Total I	348,600	164.900	1.169,100	1.682.600	

Using the data in the preceding table as a basis, the 1,682,600 acres in the survey are divided by percentages as follows:

Epidemio	
Commercial and Accessible	20%
Commercial but Inaccessible	7%
Normal (both Accessible and Inaccessible	
Commercial Timber)	72%

Without an estimate of the volumes of timber involved in the various classes of infestation, the area percentages are of little value. The 19.3 billion feet of pine timber on the 1,682,600 acres included in the 65 infestation units are divided as follows:***

Table 10.

Division of Pine Timber According to the Character of the Infestation in M.B.M.

	Epidepic				
Species	Commercial Accessible	Commercial Inaccessible	Normal	Total Volume.	
Yellow Pine	3,248,500	1,504,000	7.994.500	12.747.000	
Sugar Pine	2.561.000	381.500	3.617.500	6.560.000	
Total	5.809.500	1.885,500	11.612,000	19,307,000	

^{*}Includes Yosemite National Park.

**Includes the Sequoia National Park.

For the distribution of these figures by Forests, see the four Forest Reports.

With these data as a basis, it appears that almost 40 per cent of the timber of the survey area is suffering from epidemic infestation. All of this epidemic timber is commercial and almost 80 per cent of it is both o commercial and accessible. Of the 19,307,000,000 feet of timber included in the 65 infestation units, almost 12 billion of it, or over 60 per cent, contained only endemic attack during 1917.

The table given below shows the 1917 loss in yellow pine for the private and government timber on the four National Forests covered by the survey, together with the National Park losses. It must be remembered that the losses on any individual one of the 65 infestation units may fluctuate considerably from year to year, but that the total annual loss for an area as large as a National Forest with its 10 to 20 infestation units often remains quite constant for a number of years. However, these figures are by no means sufficiently accurate for the exact determination of allotments for insect control. Allotment estimates must be based on intensive cruises just prior to the inauguration of control work. In this table the sugar pine and yellow pine losses have been combined. More detailed data are given in the four individual Forest reports, and in the "Summary of the Data on the Infestation Units."

Table 11.

1917 Pine Loss within the Infestation Units by
Ownership.

Forest	Private Loss in M.B.M.	National Forest Loss in M.B.M.	National Park Loss in M.B.M.	Total Loss in M.B.M.
Eldorado	1.498	642	0	2.140
Stanislaus	1.831	2,149	312	4.298
Sierra	3,427	5,665	416	9.508
Sequoia	1,296	5,902	2,432	9,630
Total	8.052	14.358	3,160	25,570

· Or 39

Thus the 25,570,000 board feet of sugar pine and yellow pine loss in 1917 is distributed by ownership percentages as follows:

In private timber 31%
In National Forest timber 56%

In National Park timber 13%

In addition to the insect loss within the enfestation units, there is a 1917 loss in the scattered pine timber on the rest of the four Forests amounting to $3\frac{1}{2}$ million feet. Most of this $3\frac{1}{2}$ million feet loss is in National Forest timber. The actual 1917 pine loss inside and outside the infestation units, is, therefore 29,091,000 board feet. A considerable percentage of this loss occurred in areas involved in epidemic infestation, as the totals in following table will show. The loss as given is for the infestation units only. The loss outside of $3\frac{1}{2}$ million is practically all of a non-epidemic character.

Table 12.

1917 Insect Loss Divided According to the Character
of the Infestation responsible for it.

Forest	Loss in epidemic Commercial and Accessible tim- ber.	areas M.B.M. Commercial but inaccess- ible timber.	Loss in areas not epidemic in M.B.M.	Total Loss.
Eldorado	0	0	2,140	2.140
Stanislaus '	0	G	4.292	4.292
Siarra	8.479	818	211	9.508
Secuois	6.279	3.351	0	9.630
Potal	14,758	4,160	6.643	25.570

It is evident, therefore, that 74% of the 1917 loss within the 65 infestation units is within areas involved in epidemic infestation, and that

this 74% is confined to less than a third of the total area of these infest ation units. By controlling the epidemic infestations, we, therefore eliminate by far the greater proportion of the total insect loss on all of the valuable timber stands within the four National Forests, both Government and private, and the Sequoia and Yosemite National Parks.

25/5/000

CONTROL MEASURES.

Investigations and discussions in regard to the cause of the rise and fall of epidemics and the proper methods of controlling them are not within the province of this survey. These are matters which call for intensive and detailed investigations. In the conduct of this survey the endeavor has been made, first of all, to secure the evidence to show whether or not the forest insect problem in the pine stands of southern California is worthy of further and more serious consideration on the part of private and public timber owners. This report is, therefore, primarily a tabulation of the amount of pine timber lest through insect damage, and a consideration of the feasibility of avoiding all or part of this loss. The initiative for protective measures lies with the private owners, or in the case of public timber with those charged with the responsibility for their protection. As a result of years of research, the Bureau of Entomology has developed certain control methods, and until it is evident that they are not adequate or effective there is no apparent reason for adopting contrary methods. (This is particularly true in the matter of the protection of public timber where any importent variations from accepted methods should be restricted to control projects which are strictly investigative and are carried on with the approval of the Bureau of Entomology.)

The amount of the loss and its effect upon the forest resources of an area is the only real basis upon which to guage the desirability of control work. For every dollar invested in insect control it is only reasonable to expect at least an equal return in the value of the timber saved. This is true whether the timber is protected for its commercial value, its watershed protection effects, or its esthetic and sentimental value. The first control work that should be under taken, therefore, is that of the epidemics in that private and public timber within the National Forests which is both commercial

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and accessible, and the epidemics within the Sequois National Park, the coradication of which are justified from the esthetic standpoint. That expenditures for control work in such stands of timber will justify themselves is reasonably certain. 548,600 acres or slightly over 20% of the survey area contains epidemic stands of this character.

After the most valuable pine stands have been protected, attention can then be turned to the commercial but inaccessible pine timber. That centrol work in such timber will prove a wise investment is not so certain: primarily because of the long period of time which will probably elapse between the control work and the utilization of the timber. When the insect problem concerns large areas of inaccessible timber which will not be utilized for a generation or two to come, then the insect losses will probably be compensated by growth in the inaccessible region as a whole, especially since the insect epidemics in the California yellow pine and sugar pine cause an annual loss of a few per cent at the most, and even this loss is usually not maintained for very many years. Further, when a large area is under consideration, for instance, several hundred thousand acres scattered through a region of five or six million acres as is the case with the inaccessible pine timber of this survey, only portions of it are involved in epidemic infestation at any one time. For this reason, control work in the commercial pine timber which is not accessible is only of secondary importance. Only about 165,000 acres or less than 10% of the survey area contain stands of commercial but inaccessible stands of timber suffering from spidemic infestations.

Almost 70% of the survey area, or 1,169,000 acres, contains commercial (both accessible and inaccessible) pine timber, on which in 1917 only endemic infestation resulting in an annual loss of considerably less than one-tenth of one per cent was at work. Control work in infestations of this character has not been carried on thus far in any large project in California, 2 and yet it is believed that the working of these large areas containing only endemic infestation

may ultimately be the solution of the problem of preventing the beginning 43 of epidemic infestations where they do not now exist. It is evident that with a given allotment a much larger area of endemic infestation can be covered than is the case when epidemic attacks are treated. However, until the control of endemics has been tried on a few projects, it will be difficult to ascertain the relative financial advantages between working an epidemic in valuable timber and an endemic in timber of equal value.

any individual unit with the 1917 survey data as a basis primarily because the survey data is not intensive or accurate enough on which to base allotment estimates. Further, it is easily possible for the infestation on any individual unit to fluctuate a great deal even in the course of one or two years. The only accurate estimates are those made within six months of the actual control work. However, it is believed that the cost estimates as given below are applicable to the survey area as a whole, and are sufficiently reliable on which to formulate a definite insect control policy for the 1917 survey area.

In the preceding paragraphs an attempt has been made to show the relative desirability of controlling epidemic and endemic infestation. In the table to follow the costs of controlling these infestations are estimated, using as a basis the 191% spring infestation, and \$4.00 per thousand board feet for treating infested sugar pine and yellow pine. Because of the increase in the cost of labor and supplies, \$4.00 is beli ved to be a conservative figure. No accurate data are available for the cost of treating an endemic infestation, but because of the fact that the infested trees are widely scattered, \$8.00 per M is not believed to be too high. A maximum and minimum cost is given, the actual cost depending on the percentage of the infestation to be removed. The control costs are also based on the assumption that the worl will be completed in one year, and have been apportioned between the Forest

Table 13.

Cost of Control Work in Yellow Pine and Sugar Pine. (Based on 1917 Spring Infestation)

Ownership	Epid	emics	Normal	Total
	Conmercial & Accessible Pine.	Commercial & In-	Attacks.	Costs.
Narional Fo	19,000 rests	5,000	17,000	41,000
	25,000	7,000	23.000	55,000
National Pa	5,000 rks	0	4,000	9,000
	7,000	0	6.000	13,000
Private	12,000	3,000	9,000	24,000
Maria de la companya della companya	15.000	4, 000	13.000	42,000
Total	\$36,000	\$8,000	\$30,000	\$74,000
	47,000	11,000	42.000	100_000

^{*} The epidemic infestations in the National Parks demand control from the esthetic and scenic aspects, hence all this loss is put in the class in which control work is of first importance.

The above cost estimates are of course based on the 1917 spring loss on the infestation units as determined by the survey, and since it is felt that these loss figures are conservative, it is believed that the maximum cost estimates will more nearly approach the actual cost of control than the minimum amounts. Further, it is not at all impossible for the 1918 or 1919 loss to become considerably greater than of 1917, thus making the control costs more nearly approach the maximum figures.

Practically all of the epidemic units, except those few entirely within the Sequoia National Park, contain more or less private land.

Cooperation from private owners is therefore essential in the inauguration of any effective insect control policy on the Sequoia and Sierra National Forests. The same thing is true in the case of the endemic or normal infestation in case it is finally decided that control work in such infestations is desirable.

The most urgent work is of course the control of the epidemic attacks in the Commercial and accessible pine timber in the Sierra and Sequoia National Forests, and the epidemic infestations in the sugar and yellow pine of the Sequoia National Park. In this class are 26 infestation units covering an acreage of over 348,000 acres. It would be quite difficult from the administrative standpoint to work all of these areas the same year, even if the necessary funds were made available. There are only a few lumber companies in the survey area which, because of their experience in past control projects. are able to carry on the work on their own holdings with a minimum of attention from the Bureau of Entomology and the Forest Service. The Yosemite Lumber Company and the White and Friant Lumber Company for instant, have had firsthand experience with insect control work. The Forest Service has found it rather difficult in California to carry on more than three or four widely scattered control projects in any one year with any satisfactory degree of efficiency, because sufficient men with requisite experience are not available. The Forest Insect Station of the Bureau of Entomology at Ashland.

Oregon, has found the same thing to be true in supervising control projects on the National Parks and on private lands in California. There are then these personnel limitations, both in the Bureau of Entomology, and the Forest Service, which make it rather difficult to complete in a single year even those 26 epidemic control units which now exist in the commercial and accessible pine timber of the survey area. In addition, there is the problem of securing an adequate number of skilled woodsten for a month or six weeks in the spring for the treatment of the timber.

In studying insect losses in the pine timber of California it has become evident that epidemics quite frequently begin simultaneously over considerable areas which are much larger than our infestation units, indicating perhaps that the most effective control work is that which includes within a year or two a considerable proportion of such a large epidemic.

From this standpoint, the working of all the epidemic units on the survey area within a year or two of each other seems exceedingly desirable.

The amount of control work which can actually be inaugurated, in accordance with Bureau of Entomology methods, now that the insect conditions revealed as a result of the 1917 survey have been outlined, will, of course, depend upon the money made available for the protection of the government—owned timber and on the extent of the cooperation which the private owners* are willing to furnish.

^{*} A separate report has been prepared for the information of each cooperator. In addition, reports for each of the four National Forests have been compiled for the use of the Forest Supervisors, and to make available more detailed data on timber estimates and insect losses than can be found in this general report.

Ashland, Oregon, November 27, 1917.

Dr. A. D. Hopkins, Washington, D. C.

Dear Dr. Hopkins:

I am enclosing herewith a set of individual reports for the private owners who cooperated in meeting the expense of the California Insect Survey. This seems to me to be about the only satisfactory way to give out specific information in regard to conditions on patented holdings. For one thing conditions differ greatly on the various holdings, and the same situation may effect one owner quite differently from the way in which it may effect another. Some of the companies also might take exception to having the information in regard to conditions on their own land distributed to the other owners.

It was our plan that these reports, after they have been reviewed by you, should be sent out to the individual cooperators from your office with a letter of transmittal. I am enclosing only those reports where the examination was made by the men of this Bureau. Reports of these tracts where the examination was made by the Forest Service men will be forwarded to you through the Forester.

It is understood that all reports will be amended if they do not conform strictly to the policies of the Bureau of Entomology. Some of the reports seem to call for special consideration. This is especially true of the report to the White and Friant and Yosemite Lumber Companies in regard to their Tuolumne tract of timber, on account of the previous control work and our own association with the situation through our work on the Yosemite National Park. I hope that you will go over this carefully and correct any statements with which you do not agree.

In the copy of the reports on each individual unit which are to accompany the general report, copies of which were mailed to you on the 24th, an error has been noted in the form. You will note that the form states "Number of Infested Trees (estimated from Factor) ". This does not mean infested trees but trees killed by insects in 1916 and 1917, including both infested and abandoned trees.

Yours very truly,

JMM-AS Enc. Assistant Forest Entomologist.

Report of the Results of the

1917 Insect Survey of the Pine Timber on the

Holdings of the Sanger Lumber Company of

Sanger, California.

Nature of the field examination.

The holdings of the company in the vicinity of Hume, California, were examined by J. M. Miller of the Bureau of Entomology on August 3, 4, and 5, 1917. Manager Hume spent part of one day with the examiner. In the insect reconnaissance the pine timber in the Bearskin and Long Meadow Creek basins and that in the vicinity of Hume was given special attention. At the suggestion of Manager Hume, no examination was made of the areas near the cutting operations, primarily because on such lands the pine timber will be cut out before the insects can do very much more damage.

Character of the Infestation.

During the two year period 1916 and 1917, the insect loss is estimated to have been 66 trees or 132,000 board feet in the yellow pine, and 27 trees or 135,000 board feet in the sugar pine, a total of 267,-000 board feet for both species.

The loss in the yellow pine, due to the western pine beetle

(Dendroctonus brevicomis). has been increasing during the past two years,
while the damage by the mountain pine beetle (Dendroctonus monticolae) in
sugar pine has remained fairly constant during the same period.

The holdings of this company are situated in a general region in which the infestation in the pine timber is considered epidemic, that is it is of sufficient severity to warrant remedial measures. The National Forest lands within the Hume basin contain about the same amount of in-

festation as that which exists in the Hume Basin, although immediately east and south of this basin the insect losses are of little consequence.

It cannot be definitely stated whether or not the insect loss during the next few years will be very much in excess of that which occurred during the two year period 1916 and 1917, but ordinarily such infestations in the pine timber of the region only increase gradually, and are usually not subject to sudden fluctuations. In the vicinity of the logging operations on the company's holdings the continued cutting will tend to keep down the infestation in the standing timber by furnishing the bark beetles with attractive debies for breeding places.

Recommendations

Inasmuch as this company plans to complete the logging of this tract of timber within the next few years, the insect situation in Hume Basin does not seem to require remedial measures. If, however, it is decided to hold a certain part of the timber for the future, control measures would result in the saving of considerable valuable timber.

Should the company decide to carry on control work, such work cannot be done until the spring of 1918. The extensive reconnaissance of the Hume basin indicates that the necessary control measures would involve the treatment of 100 to 150 infested trees with a volume of 150,000 to 250,000 board feet, at a cost ranging between \$600 and \$1000.

Before control work is actually instituted, the following steps are considered to be essential:

1. A further examination of the Hume basin as early as practical in the spring for the marking of the newly infested trees on the area and for more accurately determining the amount and character of the necessary control work.

2. The securing of the cooperation from the Forest Service and private owners in order that the infestation in the region will be cleaned up simultaneously and a sufficient area worked to insure adequate protection.

For further information and advice in regard to the proper methods of control and the technical matters connected with them, the company is referred to the publications of the Bureau of Antomology. Correspondence on these matters may be addressed to the Bureau of Antomology, Washington, D. C.

Assistant Forest Entomologist

November 24, 1917.

of the 1917 Insect Survey of the Holdings of the Blodgett Lumber Company.

Nature of the field estamination

In accordance with the plan of the entomological survey of the pine timber of California, the holdings of the Blodgett Lumber Company in Eldorado County were examined by Albert Wagner of the Bureau of Entomology during the period from August 27 to September 5, 1917. Almost the entire examination was conducted in company with Hr. H. H. Davis, representative of the Blodgett Lumber Company, whose thorough cooperation on this work made possible a much more effective examination than would have been possible without his assistance.

An extensive examination was made of the entire tract, and certain, sections were covered closely in order to obtain a more accurate basis for judging sonditions on the remainder of the company's holdings. The regular methods employed on all other areas of the survey were used.

Character of the Infostation.

In proportion to the stand the insect loss in the sugar pine and yellow pine is the least of that of any area covered in the 1917 insect survey. There is a certain amount of infestation of the mountain pine beetle.

Dendroctonus monticolae, in sugar pine, and the western pine beetle, Dendroctonus brevicomis, in yellow pine. The largest number of trees recorded on any one section is 5, while the entire tract will not average more than 2 infested trees per section. In addition all indications point to some decrease in the infestation during the past 3 or 4 years. For example on

Section 20, T.12 N., R.13 R., M.D.M. which was cruised, and on which 6 infested trees were marked by Mr. Davis and H. M. Burke in 1913, only 1 infested tree was found in 1917. To some extent this decrease appears to be true of conditions generally throughout the holdings of the company and adjacent government timber.

Recommendations

In view of these conditions control work does not appear to be necessary or desirable, as the great expense involved in treating a few infested trees on the area would greatly exceed the amount of good which would be accomplished.

It cannot be seefely predicted, however, that the infestation will remain in the present condition for any definite period of time. The tract should be given a certain amount of attention annually, and prompt action taken if any serious increase is noted.

For further information and advice in regard to the proper methods of control and the technical matters connected with them, the company is referred to the publications of the Bureau of Entemployy. Correspondence on these matters may be addressed to the Bureau of Entemployy. Washington, D. C.

Assistant Forest Entomologist.

Movember 24, 1917.

Report of the Results of the

1917 Insect Survey of the Pine Timber on the

Holdings of the Westside Lumber Company, Tuo
lumme, California.

Nature of field examination

In accordance with the plan of the insect control survey of the pine timber in California, the lands of the Westside Aumber Company were examined by Mr. W. S. Glendenning of the Bureau of Entomology during the period from July 14 to August 1, 1917. An extensive recommaissance was made of the entire tract owned by this company situated for the most part in the Clavey Miver watershed, and 1550 acres of the same tract were covered closely in order to obtain a more accurate basis for judging conditions on the remainder of the company's holdings. The Testside Lumber Company provided a field party to meet the expenses of this work.

Character of the Infestation

The total loss caused by insects including both public and patented land, during the past two years was reported by Mr. Glondenning as follows:

	Yellow	line	Sugar P	<u>ine</u>
	No. Trees.	Board feet	No.Trees	Board Ft.
Infested trees	17	59,910	5	39,900
Abandoned trees	72	162,090 202,000	28	187,660 227,560

The infestation on the tract is divided according to ownership about as follows:

	Infested Trees	Abandoned trees.	
Westside Lumber Co.			
Yellow Pine Sugar Pine	9 3	25 14	
wagaz - zav			
Tuolumne National Forest			
Yellow Pine	8	47	10.10
Sugar Pine	2 60	14	55

In view of the small emount of loss in proportion to the total stand of timber on this tract, and the continued presence of logging operations, the expense of any control operations will not be justified by the amount of good which would be accomplished. Unless there is a very pronounced increase in the rate of animal loss and the amount of infested timber on this tract, which at present does not appear to be probable, it is considered that no action can be recommended which will greatly improve present conditions or would be practical in view of the expense involved. Mr. Glendenning's conclusions in regard this are as follows:

"Nothing was found that would warrant a recommendation leading to insect control action, nor is anything found that could bring about uneasiness on the part of the owners attributable to forest insect depredations.

It is time that some little infestation is listed in the foregoing report, but when compared with the area and stand of timber it is insignificant. Scarcely a typically infested tree was found on the unit and of the figures given over 50% of the trees were estimated in order to cover the possibility of having over-looked a part of the infestation.

As to old infestation, there is nothing to show in the way of old dead trees, that this area has even been visited by any serious outbreak in past years. An occasional tree has been killed, from year to year, but not enough of these are in evidence to attract the attention of any one not looking for them.

In conclusion I have nothing to recommend in the way of control measures.

that I would consider a benefit to the owners at this time."

Assistant Forest Intomologist.

Hovember 24, 1917.

1917 Insect Survey of the Pine Timber on the Holdings of the Madera Sugar Pine Company.

Sugar Pine, California.

Nature of the field examination

In accordance with the plan of the survey of pine timber in California, the tract of timber, owned by the Madera Sugar Fine Company in Madera County was examined by John R. Patterson of the Bureau of Antomology during July 1917. An extensive examination was made of the entire tract and certain sections were covered closely in order to obtain a more accurate basis for judging conditions on the remainder of the company's holdings.

Character of the Infestation

The insect loss for the seasons of 1916 and 1917 was found to be approximately four trees per section and does not exceed 10,000 board feet volume per section. This loss is distributed generally over the company's holdings.

The western pine beetle. <u>Dendroctoms brevicomis</u> Lec. in yellow pine, and the mountain pine beetle. <u>Dendroctoms monticolae</u>. Hopk. in sugar pine are primarily responsible for the pine loss in the company's holdings. The infestation of both species does not appear to have increased to any appreciable extent within the past two years.

The infestation in the adjoining timbered lands is practically of the same character as that within the company's holdings, and should receive the same attention in future examinations or control measures.

The timber in this tract is for the most part mature: this condition together with a preponderance of the pine type and range of elevations are factors that in all probability will always induce an infestation of more or loss intensity. It is impossible to state whether or not the amount of loss will increase or decrease in the near future, but it is improbable that it

will materially exceed the average annual loss recorded for the season of 1916 and 1917.

The present infestation is not epidemic and is only occasioning minor losses in the merchantable timber. The company's cutting areas are extensive, and offer attractive conditions which should partially confine the future infestation to the logged areas, and as the company expects to continue the logging operations over the remainder of their holdings within the next few years, the total loss from insects in the meantime would hardly repay the cost of control.

Estimates and recommendations

It would appear from the status of the present infestation and the resultant effect of the company's large logging operations in this tract, that control work for the present, at least, would not be desirable or profitable.

If, however, control should be considered desirable in view of reducing the present loss or because of more serious conditions which may develope in the future, the following steps are considered to be essential:

1. A further examination of the timbered holdings of this company and all adjoining timbered lands for the purpose of marking all newly infested trees. This should be done as early as possible in the spring preceding actual control work.

2. Cooperation with the Forest Service and other private owners should be arranged in order that the infestation on adjoining lands will be controlled sufficiently to give adequate protection.

For information and advice in regard to the proper methods of control and technical matters connected with them the company is referred to the publications of the Bureau of Entomology. Correspondence on the latters may be addressed to the Bureau of Entomology. Washington. D. C.

Entomological Manger.

Pacific Slope Station, Ashland, Oregon.

Statement to the
White and Friant Lumber Company and
The Yosemite Lumber Company, regarding the tract of
timber between the Merced and Tuolumme Rivers,
near El Portal, California.

In accordance with the plan of the entomological survey of the pine timber in California, this tract of timber which is jointly protected by the White and Friant Lumber Company and the Yosemite Lumber Company, was examined during June and July 1917.

The history of the efforts which have been made during the past four years to control the infestation within this tract, and the adjoining lands on the Yosemite National Park are perhaps too familiar to both of the interested companies to require more than a reference in this report. However, the work of the general survey during the present year was so involved with that of other examinations preliminary to control, that it seems proper to include all activities in this general statement.

Following the control work of 1916 on the lands of those companies it was considered that further work was still necessary in certain parts of the patented lands and on the lands of the Yosemite National Park directly to the east of these, which had not been previously covered in control projects, together with National Forest lands included in or adjoining the general area. Plans were made to pool the interest of all parties interested and to begin work as soon as weather conditions would permit in the spring of 1917.

In view of making the necessary preliminary reconnaissance for starting the actual control, Mr. Proudfoot representing both lumber companies, proceeded to Coulterville, California, to begin an examination of the western part of the area. Mr. J. M. Miller and W. E. Glendenning of the Bureau of Entomology, began an examination of adjoining areas in the Yosemite National Park. These preliminary examinations were started early in April.

A very late spring and heavy snow make it impractical to get into the higher elevations, including those parts of the area where control work was contemplated, before the first of June, but the month of April was spent in making a close examination of the accessible parts of the yellow pine belt. Mr. Proudfoot reported an almost complete absence of evident infestation in those parts of the area which he had been able to cover. Miller, Glendenning and Ranger Adair of the Yosemite National Park made a close intensive cruise of the Crane Creek basin covering approximately 300 acres. All insect-killed trees, whether abandoned or infested since the control work of 1914, were marked, numbered, and registered. Three infested yellow pine totaling 8500 board feet were cut and treated. On April 28, 1917 a conference was held at Yosemite between Messrs. Griffing and Proudfoot of the White & Friant Lumber Co., Carl Backem of the Yosemite Lumber Co., Supervisor Lewis of the Yosemite National Park. T. D. Woodbury of the Forest Service, and J. M. Miller of the Bureau of Entomology. It was decided that in view of the very small amount of infestation which could be detected and because of the impossibility of working at the higher elevations of the tract until the snow disappeared, it would be best to postpone plans for work until a reconnaissance could be made of that part of the area where control work was contemplated. It was also considered that on account of the late, cold spring, the foliage of

infested sugar pine would be very slow in turning.

During May. 1917. Mt. Glendenning and C. F. Adair examined the forests along the western boundary of the Yosemite National Park and Mr. Proudfoot worked further back into the tract from Coulterville. By the first of June the Coulterville road was open and Proudfoot and Miller left Coulterville on June 4 and spent the period from that date until June 7, at the higher elevations of the tract working out into the timber on both sides of the Coulterville road. During this reconnaissance three fading-topped sugar pines were found and one slightly infested yellow pine. Two of these sugar pines showed no indication of infestation except at the very top. Mr. W. E. Glendenning after spending a week in the northern and eastern part of the tract reported an equal difficulty in finding evidence of even slight infestation. As this examination was conducted during a period of extremely warm weather, it seemed improbable that any serious amount of infestation would be found during the period suitable for spring control work. This made the matter of establishing control camps and effecting a large organization for such work quite impractical. Under the usual methods of work it would be almost impossible to find enough trees to occupy even a small crew and a waste of funds would result. This situation was stated by J. M. Miller in his letter of June 11 to Mr. Bachem of the Yosemite Lumber Company, a copy of which was furnished to the White and Friant Lumber Co., the Supervisor of the Yosemite National Park and the District Forester. It was generally decided to let the matter of control work rest until evidence could be found which would show that a more aggressive campaign was practical.

A systematic survey of the tract was then undertaken by Messrs. Glendenning and Proudfoot, and the period from June 11 to July 15 was spent in the lands of these two companies and the adjoining National Forest lands. It was understood that any infested trees which could be recommended for treatment would be cut, providing such a course seemed practical by securing labor locally for the purpose.

The results of Messrs. Glendenning's and Proudfoot's survey were reported by Glendenning. The loss, as determined up to July 1 on the tract owned by these companies and on the public lands included and immediately adjoining is given as follows:

			ted Trees*		ned Trees
		No. Tree	s. M.B.M.	No. Tre	es. M.B.M
White & Friant Lumber Co.	Yellow Pine	5	10,000	21	42,000
	Sugar Pine	4	28,000	1	7,000
Yosemite Lumber Co.	Yellow Pine	7	10,000	9	18,000
	Sugar Pine	9	56,000	10	70,000
Forest.	Yellow Pine	14	14,000	44	44.000
	Sugar Pine	3	15,000	5	25,000
Yosemite National Park	Yellow Pine	1	2,000	1	2,000
	Sugar Pine	0	0	0	0

These data apply only to conditions as they were found during the period of the survey and can apply only in a limited way to conditions which may have developed later in the season or during the next year. There is nothing to indicate,

*The footage of these trees is assumed being based upon general averages and volumes secured from a number of trees which were measured. The number of trees however is considered fairly accurate for the period represented being based upon the true actually found and increased by 40% in a close equination of the area.

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however, that there will be a pronounced increase, but necessarily no positive predictions can be made.

The western pine beetle, <u>Dendroctonus brevicomis</u> in yellow pine, and the mountain pine beetle, <u>Dendroctonus monticolae</u> are primarily responsible for the loss recorded.

Significance of Present Conditions.

It is fairly evident to any one who will carefully study the situation, both upon this tract and in the surrounding forests, that all the evidence which could be obtained in the spring season of 1917, pointed to a very marked decrease in the amount of infestation over that of the past three or four seasons. It is only fair to assume that the control work carried out in this region in recent few years contributed to this reduction. No prediction can be made, however, in regard to the length of time that the infestation will remain in the condition indicated in the spring of 1917. It may at any time increase.

Inasmuch as both companies interested in this tract have conducted control operations of considerable extent upon the area, any recommendations as to procedure and estimates of cost, do not appear necessary. The phase of the problem which does require consideration is the insect control policy which should be followed after the infestation is reduced to the point now apparent on this area.

The cost of treatment of the total infestation such as now exists, will be high on account of the difficulty of locating all of the widely scattered infested trees, and because of the very large area which must be covered in proportion to the footage of infested timber which can be treated.

Actual estimates of the cost of treating all of a normal infestation in this condition cannot be given, for the reason that no control projects have been carried out in an infestation as light as this, and no comparative cost figures are available. It is evident, however, that the cost of treating such trees per M. Board Measure would greatly exceed that of any previous work done on the area, and that this cost will greatly exceed the relative value of the timber which would be killed by insects during a period of years at the present amnual rate of loss. The desirability of control under these conditions is a matter which can only be decided by the owners of the timbers.

The Bureau of Entomology stands squarely on the basis that the complete extermination of the insects is possible only at a prohibitive cost, but that a permanent insect control policy should be adopted with a view of holding downt the infestation to a point where serious outbreaks will not occur. It further believes that the treatment of an adequate percentage of the infestation will accomplish the desired result in a practical way and at a cost which will justify the expenditure in proportion to the amount of timber which can be saved. For example, on the Crane Creek basin within the Yosemite National Park, immediately adjoining the lands of the White & Friant and Yosemite Lumber Companies, approximately \$239.00 has been expended on 2500 acres since 1915 with the result that the loss of commercial timber was reduced from 124,920 board feet to 30,470 board feet in 1916, without treating in the initial control work more than 50% to 75% of the infestation. This area is referred to because it is included in this tract and has been intensively studied as a check area. All trees killed

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by insects since 1913 have been marked, numbered and recorded, and any one who cares to do so can verify these results.

On a number of control projects an effort has been made to secure all of the infested trees and this purpose has never been accomplished even by the most careful, intensive work, either in initial control work or in recleaning in subsequent years. Added to this there is also a certain amount of loss that will inevitably occur from other causes than insects, such as lightning, diseases, wind fall, etc.

A policy of insect control, in keeping with that advocated by the Bureau of Entomology, as it would apply to the area in question, would avoid establishing semi-permanent control camps with a large force of men. As a suggestion, the area would be treated by one or perhaps two small crews of two or three men equipped so as to move camp often, covering the entire area each season during the spring and early summer. The infested trees that can be conveniently reached would be treated. The presence of a number of roads on this tract makes it readily adaptable to this method.

November 24, 1917.

Assistant Forest Entomologist.

J. m. mille

Insect Control Survey Stanislaus.

REPORT

on the

INSECT SURVEY

of the

CHAS. F. RUGGLES HOLDINGS

within the

STANISLAUS NATIONAL FOREST

during the

Summer of 1917.

November, 1917.

Forest Exeminer.

Approved:

. 1917.

Acting District Forester.

Nature of the Field Examination.

These holdings were examined during the latter part of August and early September, 1917, by A. J. Jaenicke of the Porest Service, in accordance with the informal agreement entered into by Mrank J. Solinsky of San Francisco with the Bureau of Entomology, and the Forest Service. The pine timber was examined by a method of extensive reconnaissance which yields insect loss data sufficiently accurate for all preliminary purposes.

Stanislaus National Forest between the North Fork of the Stanislaus River and the North Fork of the Mokelumne River, and that lying just west of of the Forest boundary in Townships 5 and 7 North, Range 14 East, M.D.M., was covered in the survey.

Character of the Infestation.

pine on these holdings was considerably less than it was five or six years ago. In fact the present infestation has remained fairly constant during the past two years and is at present of little importance from the standpoint of timber losses.

In 1917, the insect damage in yellow pine and augar pine averaged consuchat less than three trees per section.

This loss, however, was to come extent confined to the larger trees of the stand as is brought out in a subsequent table.

Further, the greater majority of these trees appeared to have been healthy in every other respect, the western pine bootle* being responsible for the death of the yellow pine, and the mountain pine beetle * for the sugar pine losses. That portion of the yellow pine and the sugar pine timber which occurs in fir stands was much freer from insect amage that that which occurred in pure stands on the tops of the ridges and on the south slopes.

The following table gives in brisf the insect loss data obtained on the Ruggles holdings in 1917.

	LALLOW PING	mgar Pine	Potal
No. of trees lost by insects : in 1917.	225	2 3	28
Approximate sverage volume of: the insect-killed trees in : board feet. :	2.400	5.900	*
Volume of 1917 insect loss in board feet.	540,000 :	136,000	:676,000

^{**} Dendrectorus brevicomis.

** Dendroctorus monticelae.

on the Ruggles heldings of somewhat less than one-tenth of one percent of the pine timber stand, and consequently the insect infestation in its present status cannot be considered a serious menace to the timber. However, no assurance can be given that these lesses will not in the future become greater, for in the vicinity of Dorrington, Esyward Creek, and Fulsom there was evidence of some infestations in the past.

Recommendations.

Inasmuch as the infestation new existing on the Company's holdings is of a so-called "normal" character and involves such a small percentage of the stand, and since there is no evidence that even this small loss is increasing, no control measures are at present necessary for the protection of the remaining timber. It is believed, however, that the treatment of at least a portion of the lew infested trees and a little attention from time to time to the insect conditions on these holdings may prevent the recurrence of an optionic infestation.

In a scattered light intestation such as the one under consideration, the cost of treating the infested timber would probably be about \$6.00 per M. coard feet. To treat any considerable portion of the infested trees would cost,

therefore, from 4000 to \$5000. In carrying on this work on these holdings it is quite essential to success that the infestation on the Brown and Van Buskirk, B. D. Weston, and Forest Service holdings be worked at the same time. Without a simultaneous treatment of all of the holdings in what might be called the control unit, the cleaned area is very apt to be reinfested by adjacent untouched timber.

the technical matters related thereto, the Thiteside Rumber Company is referred to the publications of the Bureau of Entomology of the Department of Agriculture. The Bureau of Entomology, of Washington, D.C., stands ready to give information and advice on specific problems which may arise in connection with the forest insect problem on the Company's holdings.

Insect Control Survey Stanislaus.

REPORT

Min. A

on the

INSECT SURVEY of the JAMES DUCKY HOLDINGS

within the

STANISLAUS NATIONAL FOREST

during the

Summer of 1917.

Hovember, 1917.

Eprest Exeminer.

Approved:

. 1917.

Acting District Forester.

Nature of the Field Examination.

These holdings were examined during the first two weeks in August, 1917, by A. J. Jaenicke of the Forest Service, in accordance with the informal agreement entered into by the owners with the Bureau of Entomology and the Forest Service. The pine timber was covered by a method of extensive insect recommaissance which yields insect loss data of sufficient accuracy for all preliminary purposes. Because of the fact that the James Ducey holdings occur in scattered tracts lying between pine timber belonging to the Whiteside Lumber Company, the Standard Lumber Company, the Tuolumne Sugar and White Pine Company, and the Government, it was much more difficult to obtain reliable estimates of insect losses than would have otherwise been the case.

Character of the Infestation.

The 1917 insect loss in the yellow pine and sugar pine on the James Ducey's lands was exceedingly light. In fact the same thing is true of all the Government and private pine timber between the Middle Fork and North Fork of the Stanislaus River, an area containing perhaps 700 or more million board feet of yellow pine and sugar pine. The few trees, however, which are being killed are of a kind that are better and larger than the

sugar pine. For instance, the average volume of the yellow pines killed by the western pine beetle* on the James Ducey's holdings in 1916 and 1917 was slightly over 2400 board feet. The sugar pine loss is due to the work of the mountain pine beetle. and during 1916 and 1917 the sugar pines killed by this insect had an average volume of almost 5900 board feet.

It is estimated that in 1917, the insect damage to the pine timber on these lands was as follows:

1917	Insec	2,-	Loss.
when the state of	with the fact that he ?		THE SALE SALE OF

Species	: Musber trees in 1917 : insect loss.	volume of loss in board feet.
Yellow Pine	25	60,000
Sugar line	: 4	24,000
Total	29	84,000

and no predictions can be safely made as to whother the near auture will see any great increase over the 1917 loss. Inasmuch as the annual insect loss now occurring on these lands is only a few hundredths of one per cent, insects cannot now be considered a factor of any consequence in the loss of pine timber.

^{*}Dendroctonus brevicomis
**Dendroctonus monticolee.

Between the Middle Fork and the North Fork of the Stanislaus River there are evidences in a number of localities of epidemic insect losses which occurred from 5 to 10 years ago, but even in these the total insect loss during the life of the epidemic infestations was only a few per cent of the pine stand.

Recommendations.

Inasmuch as the infestation now existing on the Company's holdings is of a so-called "normal" character and involves such a small percentage of the stand, and since there is no evidence that even this small loss is increasing, no control measures are at present necessary for the protection of the remaining timber. It is believed, however, that the treatment of at least a portion of the few infested trees and a little attention from time to time to the insect conditions on these holdings may prevent the recurrence of an apidemic infestation.

In a scattered light infestation, such as the one under consideration, the cost of treating the infested timber would probably be about \$8.00 per M. board feet. To treat any considerable portion of the infested trees would cost, therefore, from \$500 to \$600. In carrying on this work it is quite essential to success that the infestation on the adjacent holdings of those owners mentioned in the first paragraph

of this report be worked at the same time. Without a simultaneous treatment of all of these lands, a cleaned area is very apt to be reinfested by adjacent untouched timber.

and the technical matters related thereto, the James Ducey commany is referred to the publications of the Bureau of Entomology of the Department of Agriculture. The Eureau of Entomology, of Washington, D.C., stends ready to give information and advice on specific problems which may arise in connection with the forest insect problem on the Company's holdings.

Insect Control
Survey
Stanislaus.

REPORT

on the

INSECT SURVEY

of the

WHITESIDE LUMBER COMPANY'S HOLDINGS

within the

STANISLAUS NATIONAL FOREST

during the

Summer of 1917.

November, 1917.

Forest Examiner.

Approved:

.1917.

Acting District Forester

Nature of the field examination.

the first two weeks in August, 1917, by A. J. Jacnicke of the Forest Service, in accordance with the informal agreement entered into by the Company with the Bureau of Entomology and the Forest Service. The Company's timber was examined by a method of extensive reconnaissance which yields data sufficiently accurate for all preliminary purposes. Because of the fact that most of these holdings are fairly well consolidated between Griswold Creek and the North Fork of the Stanislaus River, made it much easier to obtain reliable data on insect losses than would otherwise have been the case. The pine timber in the vicinity of Squaw Rollow and Big Trees was also given attention.

Character of the infestation.

The 1917 insect loss in the yellow pine and sugar pine on the Company's lands was exceedingly light. In fact the same thing is true of all the Sovernment and private timber between the Middle Fork and North Fork of the Stanislaus River, an area containing perhaps 700 or more million board feet of yellow pine and sugar pine. The few trees, however, which are being killed are of a kind that are better and larger than the average of the stand, and this is particularly true of the sugar pine. For instance, the average volume of the yellow pine killed by the western pine beetle* on the company's holdings in 1916 and 1917 was lightly over 2400 board feet. The sugar pine loss is due to the work of the mountain pine boetle*, and during 1916 and 1917 the sugar pines killed by this insect had an average volume of almost 5900 board feet.

It is estimated that in 1917, the insect loss on the holdings of the Whiteside Lumber Company were conservatively those given in the following table:

1917 Insect loss.

: Number trees in 1917 : insect loss.	Volume of loss in Board feet.
: 20	48,000
6	35,000
26	83,000
	insect loss.

^{*} Dendroctonus brevicomis. **Dendroctonus monticolae.

The above loss represents an amount which is far less than one-tenth of one percent per annum of the pine timber in which it is distributed, and is therefore negligible.

There are evidences of greater annual demage by bark beetles in the past, and the recurrence of these epidemics of sufficient severity to warrant remedial measures is by no means impossible, particularly in those stands in which the pine timber occurs with practically no admixture of other species.

Recommendations.

Inasauch as the infestation now existing on the Company's holdings is of a so-called "normal" character and involves such a small percentage of the stand, and since there is no evidence that even this small loss is increasing, no control measures are at present necessary for the protection of the remaining timber. It is believed, however, that the treatment of at least a portion of the few infested trees and a little attention from time to time to the insect conditions on these holdings may prevent the recurrence of an epidemic infestation.

In a scattered light infestation such as the one under consideration, the cost of treating the infested timber would probably be about \$8.00 per M. board feet. To treat

any considerable portion of the infested trees would cost therefore from \$500 to \$600. Prior to the actual inauguration of such work, it is quite essential that cooperation be secured from the Ducey interests and the Standard Lumber Company who own adjoining timber, for unless such work is carried on simultaneously over a considerable area, the control work is quite certain to be less effective and permanent.

and the technical matters related thereto, the Whiteside
Lumber Company is referred to the publications of the
Bureau of Entemology of the Department of Agriculture.
The Bureau of Entemology of Washington, D. C., stands
ready to give information and advice on specific problems
which may arise in connection with the forest insect
problem on the Company's holdings.

Insect Control Survey Sierra.

REPORT

on the

INSECT SURVEY

of the

FRESRO FLUME & LUMBER COMPANY'S HOLDINGS

within the

SIERRA NATIONAL DE ET

during the

number of 1917.

November 26, 1917.

Kalph Hopping

Approved:

_. 1917.

Acting District Porester.

86

Nature of the field exemination.

In accordance with the entemplosical survey of the pine timber of California, and the informal agreement entered into with the Fresno Flume and Lumber Company, the holdings of this company were examined during the period August 20-25 inclusive, 1917, by Kalph Hooping of the Forcet Service.

An extensive recommaissance was made of the entire area, and cortain representative sections were cruised intensively according to the regular methods employed in the field work of this survey.

Character of the infestation.

the insect losses in 1917 amounted to an average of 15 trees
per section (sugar pine and yellow pine) with an average volume of 4500 board feet per tree, this being equivalent to a 1917
loss of over 67,000 board feet per section. This loss is largely in the sugar pine and yellow pine of the best quality.

In the yellow pine this damage is being done by the western pine beetle (Dendroctonus brevicomis), while sugar pine is being attacked by the mountain pine beetle (Dendroctonus monti colae).

on Sational Forest lands adjacent to the company's holdings the infestation is the pine timber is of approximately the same severity as that on the company's lands.

of this indestation. It is, however, quite probable that the insect losses will continue at the same, or even at an increasance rate, for some time, usless control measures are instituted.

Fecommendations.

of 1918. Because of the fluctuations is the infectation which may becar between the time which will clapse between the time of the 1917 survey and the time of central work, and since the examination of the company's holdings were only of a preliminary nature, no definite estimate can be made of the cost of control, further than that the cost of treating the necessary infected trees will be about \$4.00 per %, board feet.

If the company desires to institute remedial work, it is believed that the following preliminary steps are essential to the success of the work:

- 1. An examination of the area as early as practicable in the spring for the purpose of marking the newly infected trees on the area, and for more accurately determining the observator of the necessary control work and its cost.
- s. Cooperation with the Forcet Service and the private namers is the region is order that the infestation will be

worked simultaneously ever a safficiently large area to insure the success of the work.

For further information and advice in regard to methods of control and technical information related thereto, the Freeno Flume and Lumber Company is referred to the publications of the Eureau of Entomology. Correspondence on these matters is invited by the Eureau of Entomology. Machington, D.C.

Insect Control Survey Flacrado

REPORT

on the

INSECT SURVEY

of the

CALI OSRIA DOCE COMPANY'S ROLDINGS

within the

ELDORADO NATIONAL FOREST

during the

Sweeter of 1917.

Bovesber 10, 1917.

Rational Foront Laminer

Aprovedi

_____ 1917.

Acting District Porcetor.

Nature of the Field Examination.

the latter part of August, 1917, by Mesers. H. A. Smith and Ralph Ho ping of the Forest Service, in accordance with the informal agreement entered into by the Company with the Bureau of Entemology and the Forest Service.

of extensive reconneissance which yields insect loss data sufficiently accurate for all preliminary purposes.

Character of the Infestation.

The 1917 insect loss in the yellow pine and sugar sine connot be considered at all serious, for the innect survey revealed a loss of only 5 trees to the section with an average volume per tree of 2600 board feet. Thus the loss per section is 15,000 feet per section. This insect damage is pretty evenly distributed throughout the pine timber.

on the yellow pine the western pine bestle is re-

Dendroctonus brevicomis
*Dendroctonus monticolas.

In set loomes on the holdings of the Company have been relatly constant apping the past few years, but it espect to predicted with any reasonable degree of containity whether or not the future will see any creek increase or decline.

The constant legging on the area probably has a two-dency to keep down the infectation, incomech as the barkbeetles they are decided preference for follow timber.

Recommendations.

Consequence as the infestation new existing on the Consequence heldings is of a so-called "normal" character and involves such a small percentage of the stand, and since there is no evidence that even this small lose is increasing, so control measures are at present necessary for the protection of the remaining timber. It is believed, however, that the treatment of at least a portion of the few infested trees and a little attention from time to time to the insect conditions on these belainess may prevent the recurrence of an epidesic infestation. In a centtered light infestation, such as the one under consideration, the cost of treating the infested timber would probably be about 8. 3 per M. sourd foot.

technical matters related therato, the California Boor Company is referred to the publications of the Europe of Entomology of the Department of Agriculture. The Europe of Entomology of

Sashington, D.C., stands ready to incorpation and advice on specific problems which may arise in connection with the forest insect problem on the Company's holdings.

Insect Control Survey

SUNMARY

the Data on the

Infestation Units

en the

REDORADO, STANISLAUS, SIERRA and SEQUOIA NATIONAL FORESTS and the

YOSEMITE, SEQUOIA, and GENERAL GRANT NATIONAL PARKS and

Adjacent Private Lands.

October, 1917.

Explanatory Note.

The insect survey carried on cooperatively during the spring and summer of 1917 by the Bureau of Entomology and the Forest Service covered 65 rather distinct infestation units. The boundaries of these units are indicated on the blueprint maps of the Eldorado, Stanislaus, Sequoia and Stanislaus Sational Forests.

The data on these 66 units are summarised in the following sheets, and will be of considerable value in the preparation of working plans for insect control projects.

actually studied and chopped into. The "Number of Trees Counted" includes all the insect-killed trees seen in the course of the survey either close at hand or from a distance. It is those trees which are spetted on the blue print maps. As a result of intensive work on sample plots of a section or two in extent throughout the area of the survey it was possible to determine a converting factor which would show the relation between the insect-killed trees actually seen and those actually existing. In some units this relation was as low as 1 to 1.5, while in others it was as high as 6.

Under the head of "approximate Stand of Timber"

it was often necessary to estimate the stand with practically no reconnaissance data. Whenever control work is actually inaugurated on any of these units it will be possible to give more careful attention to the matter of the timber stand than was feasible in the working up of the survey data.

"The Total Amount of Timber Killed, 1916 and
1917" represents a two-year insect loss. It was thought
early in the survey that the 1917 loss could be determined
with fair accuracy by dividing the 1916-1917 loss by two.
The results of the intensive examination of plots throughout the survey area showed that this method of computation
of the 1917 loss would result in a figure far below the
actual conditions. The method by which the 1917 annual
loss was determined is discussed in the general report.

REDORADO NATIONAL FOREST

Infestation Units

Including

Private Timber Lands

(Units 52 - 63, inclusive)

ELDORADO NATIONAL FOREST

TABLE 1.
Timber Stand in M. ft. B.M.

	Yellow Pine	Sugar Pine	Total
Forest Service Alienated	1,168,000 2,788,000	415,000 786,000	1,583,000 3,574,000
Totals:	3,956,000	1,201,000	5,157,000
Alienated (outside)	104,000	33,000	137,000
TOTALS:	4,060,000	1,234,000	5,294,000

TABLE 2.
Timber Stand included in the Survey. in M. ft.B.M.

	Yellow Pine	Sugar Pine	Total
Forest Service Alienated	818,000 2,004,000	353,000 625,000	1,171,000 2,629,000
Totals:	2,822,000	978,000	3,800,000
Alienated (outside)	104.000	33,000	137,000
TOTALS:	2,926,000	1,011,000	3,937,000

TABLE 3.
Estimated Insect Losses, 1917. in M.ftB.M. & Values.

	Volume	Rate per M.	Value
Yellow Pine Sugar Pine	2,403 510	\$2.00 2.75	\$4,806.00 1,402.50
Total loss:	2,913		\$6,208.50

ELDORADO NATIONAL FOREST*

PINE LOSS, 1917

W.	PINE LOSS. 1917 : Ft. B.M.				
No	Name	: Yellow Pine	: Sugar Pine	Total	
52	Bear River	190,344	9,000	199,344	
53	Caldor	377,435	54,000	431,435	
54	Caps Crossing	195,225	18,000	213,225	
55	Pyramid	162,687	45,000	207,687	
56	Iron Mountain	179,635	30,000	209,635	
57	Pacific	103,536	7,263	110,799	
58	Silver Creek	57,507	32,683	90,190	
59	Little South Fork of the Rubicon	38,346	7,263	45,609	
60	Uncle Toms	46,016	130,734	176,750	
61	Pino Grande	46,016	21,789	67,805	
62	Georgetown	264,592	43,578	308,170	
63	Pilot Creek	61.355	18,157	79,512	
	Totals, in Ft.BM:	1,722,694	417,467	2,140,161	

^{*}Includes both Government and private timber.

Unit No	52	Name:	Bear River	
Period of	Examination:	Sept. 12-14,	1917.	
Examiner:	Smit	h		
Approximat	e Acreage:	24,500		
Percentage	of Ownership	(Private: o(Forest Se (National	rvice: 75%	
			Yellow Pine	Sugar Pine
Approximat	e Stand of Ti	mber (MBM)	147,000	110,000
Number of	Trees Examine	d:	•	•
Number of	Trees Counted	l;	39	1
Converting	Factor Used:		3	3
	Infested Tree mated from Fa		117	3
Average Bo	ard Foot Volu	me per Tree:	2,603	6,000
	nt of Timber and 1917:	Killed,	304,551	18,000
Condition	of Infestatio	n:		
Prima	ry Insects: _	D. brevicomis	& D. montice	olae
Statu	s (1917): <u>In</u>	creasing Dec	reasing Bala	nced
Further Da	ta: (seriousn ity of ti	ess of presen mber, etc.)	t infestation	, accessibil
Accessi	ble by road.	Infestation	not at presen	t serious.
		11 11	I four	

Unit No	53	Name:	Caldor	
Period of	Examination: _	August 10-2	0, 1917.	
Examiner:	Smith			
Approximat	e Acreage: _3	5,000		
Percentage	of Ownership-	(Private:(Forest Se	rvice: 55%	
			Yellow Pine	Sugar Pine
Approximat	e Stand of Tim	ber (MBM)	175,000	87,000
Number of	Trees Examined			
Number of	Trees Counted:		116	9
Converting	Factor Used:			2
	Infested Trees mated from Fac		232	18
Average Bo	ard Foot Volum	e per Tree:	2.603	6.000
	nt of Timber K and 1917:	illed,	603,896	108,000
Condition	of Infestation			
Prima	ry Insects:	D. brevicom	is & D. monti	colae
Statu	s (1917): <u>Inc</u>	reasing Dec	reasing Bala	nced
Further Da	ta: (seriousne ity of tim	ss of presen	t infestation	, accessibil-
Access	sible by railro	pad. Infest	ation about 5	0% in groups.
Service and				

Unit No. 54	Name: C	aps Crossing	
Period of Examination:	August 10-20	0, 1917.	
Examiner: Smith			
Approximate Acreage: 2	9,500		
Percentage of Ownership-	(Private: (Forest Sei (National I	cvice: 50%	
		Yellow Pine	Sugar Pine
Approximate Stand of Timb	per (MBM)	236,000	74.000
Number of Trees Examined:			
Number of Trees Counted:		40	2
Converting Factor Used:		3	
Number of Infested Trees (estimated from Fact	or);	120	6
Average Board Foot Volume	per Tree:	2,603	6,000
Total Amount of Timber Ki 1916 and 1917:	lled,	312,360	36,000
Condition of Infestation:	1.10		
Primary Insects: D.	. brevicomis	& D. montico	lae
Status (1917): <u>Incr</u>	easing Decr	easing Bala	nced
	70 8		
Further Data: (seriousnes ity of timb	s of present	infestation	, accessibil-
Accessible only by tr	ail. Infest	tation not at	present serious

95.

Unit No. 55	Name:	Pyramid	
Period of Examination:	Not examine	ed 19 17.	
Examiner:			
Approximate Acreage:	52,000		
Percentage of Ownership	(Private: (Forest Se (National	ervice: 80%	
		Yellow Pine	Sugar Pine
Approximate Stand of Tim	mber (MBM)	416,000	130,000
Number of Trees Examine	đ:	none	-
Number of Trees Counted		none	
Converting Factor Used:			
Number of Infested Tree (estimated from Fa		approx. 100	15
Average Board Foot Volu	me per Tree:	2,603	6,000
Total Amount of Timber 1916 and 1917:	Killed,	260,300	90,000
Condition of Infestation	n:		
Primary Insects: _			
Status (1917): <u>In</u>	creasing De	creasing Bala	nced
			98
Further Data: (seriousn ity of time	ess of presember, etc.)	nt infestation	ı, accessibil-
Not examined. This	unit consists	of an extens	ive area
containing a heavy perce	entage of the	fir type. I	t may, however,
at any time contain some	e infestation	in sugar pin	e and yellow
pine. Sugar & yellow p	ine, however,	are mixed wit	h the stand ar
part of it belongs to the	he sugar-yell	Low pine type.	

Unit No. 56 Name:	Iron Mountain	
Period of Examination: Sept.	16-18, 1917.	
Examiner: Wagner		
Approximate Acreage: 33,000 Range of elev. 3500-6000' (Prival Percentage of Ownership(Forest	te: 65%	
(Natio	nal Park:	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (ME	M) 264,000	82,000
Number of Trees Examined:	5.	
Number of Trees Counted:	24	1
Converting Factor Used:	3	
Number of Infested Trees (estimated from Factor):	72	10
Average Board Foot Volume per Tr	ee: 2,603	6,000
Total Amount of Timber Killed, 1916 and 1917:	187,416	60,000
Condition of Infestation:		
Primary Insects: D. brevi	comis & D. montic	olae.
Status (1917): Increasing	Decreasing Bala	nced
	yes	
Further Data: (seriousness of prity of timber, etc	esent infestation	, accessibil
On north side of American Rive	r there is a fair	quality of

yellow pine and sugar pine. On south side quality of pine is poor,

topography broken and steep. A very poor view was secured of south

side of river on account of fires. No centers of infestation -

infested trees found - accessible.

96.

Unit No. 57 Name:	Pacific	
Period of Examination: September 1	11-15, 1917.	
Examiner: Wagner		
Approximate Acreage: 17,000. Ran	ige of elevati	ons 3,000 to 5,000
Percentage of Ownership(Forest Se (National	rvice: 70%	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	136,000	42,000
Number of Trees Examined:	22	1
Number of Trees Counted:	27	1
Converting Factor Used:		2
Number of Infested Trees (estimated from Factor):	54	2
Average Board Foot Volume per Tree:	2,691	7,263
Total Amount of Timber Killed, 1916 and 1917:	145,314	14,526
Condition of Infestation:		
Primary Insects: D. brevicomis	& D. monticol	Lae
Status (1917): Increasing Dec	reasing Balan	nced
	уе	
Further Data: (seriousness of presentity of timber, etc.)	t infestation,	, accessibil-
Area was examined closely by reconn	naissance so f	actor of 2 is
considered adequate. There is an ap		
tion in Secs. 26 & 27, T. 11 N., R.		Infested
trees are accessible from roads.		

Unit No. 58 Name: Silver Creek
Period of Examination: September 16, 1917.
Examiner: Wagner
Approximate Acreage: 50,000 (Range of elevations 4500-7000')
Percentage of Ownership(Forest Service: 50% (National Park:
Yellow Pine Sugar Pine
Approximate Stand of Timber (MBM) 400.000 125.000
Number of Trees Examined: 4 1
Number of Trees Counted: 10 3
Converting Factor Used: 3
Number of Infested Trees (estimated from Factor): 30 9
Average Board Foot Volume per Tree: 2,691 7,263
Total Amount of Timber Killed, 1916 and 1917: 80,730 65,367
Condition of Infestation:
Primary Insects: D. brevicomis & D. monticolae
Status (1917): <u>Increasing Decreasing Balanced</u>
уев
Further Data: (seriousness of present infestation, accessibil- ity of timber, etc.)
Good views of this unit secured from the north near Orelle's
ranch and from the south near the Ice House. A slight center
of infestation west of the Ice House near the road from Riverto

Infested trees are accessible from roads.

98.

Unit No. 59	Name: _	Little South	Fork of Rubicon
Period of Examination: _	August 30	1917.	
Examiner: Wagner			
Approximate Acreage: 14	,000 (Rang	ge elevations:	: 3500 - 6500")
Percentage of Ownership-	(Private (Forest (Nationa		
		Yellow Pir	ne Sugar Pine
Approximate Stand of Tim	ber (MBM)	112,000	35.000
Number of Trees Examined			
Number of Trees Counted:		5	
Converting Factor Used:			4
Number of Infested Trees (estimated from Fac		20	2
Average Board Foot Volum	e per Tree	: 2,691	7,263
Total Amount of Timber K 1916 and 1917:	illed,	53,820	14,526
Condition of Infestation			
Primary Insects:	D. brevico	mis & D. mont	icolae
Status (1917): <u>Inc</u>	reasing D	ecreasing Ba	lanced
			yes
Further Data: (seriousne ity of tim	ss of presber, etc.)	ent infestati	on, accessibil-
This unit was viewed at	t a distanc	e from point	on the south
side of the river. No	centers of	infestation	were noted.

Approximate Acreage: 35,000. (Rang	e of elevation	4000-6000
Percentage of Ownership(Forest So (National	75% ervice: 25%	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	280,000	88.000
Number of Trees Examined;	11	9
Number of Trees Counted:	16	24
Converting Factor Used:	1	5
Number of Infested Trees (estimated from Factor):	24	36
verage Board Foot Volume per Tree:	2,691	7,263
Potal Amount of Timber Killed, 1916 and 1917:	64,584	261,468
ondition of Infestation:		
Primary Insects: D. brevicon	mis and D. mon	ticolae
Status (1917): Increasing Dec	reasing Balan	nced
	yes	
urther Data: (seriousness of presentity of timber, etc.)	t infestation	, accessibil
Area was covered closely by reconna	issance under	favorable c
ns and for this reason a low factor		
E., M.D.M. where Davis and Burke ma		

Unit No.	61	Name: P:	ino Grande	
Period of E	xamination:	August 28,	1917.	
Examiner: 3	Wagner Wagner			
Approximate	Acreage: 11	,000 (Range	of elevations	3: 4000-6000)
Percentage	of Ownership-	(Private: (Forest Se (National	rvice: 10%	
			Yellow Pine	Sugar Pine
Approximate	Stand of Tim	ber (MBM)	88,000	28,000
Number of T	rees Examined		8	2
Number of T	rees Counted:		12	3
Converting	Factor Used:			2
	Infested Trees nated from Fac		24	6
Average Boo	ard Foot Volum	e per Tree:	2,691	7,263
	nt of Timber K and 1917:	illed,	64,584	43,578
Condition of	of Infestation			
Primar	ry Insects:	D. brevicon	is and D. mon	ticolae
Status	s (1917): <u>Inc</u>	reasing De	reasing Bala	anced
Further Dat	ta: (seriousne ity of tim	ss of presenter, etc.)	nt infestation	accessibil
Approxima	tely 50% of a		d over land.	Operation now

progress. Remaining stand consists of first class yellow pine

and sugar pine. Infestation scattered and in no place epidemic.

Unit No	62	Name:	Georgetown	
Period of E	xamination:	Sept. 5 - 3	10, 1917.	
Examiner: _	Wagner			
Approximate	Acreage: 57,0	000 (Range	of elevations	s: 2000-5000)
Percentage	of Ownership	(Private: -(Forest S (National	ervice: 50%	
			Yellow Pine	Sugar Pine
Approximate	Stand of Timbe	er (MBM)	456,000	142,000
Number of Tr	rees Examined:		22	4
Number of Tr	rees Counted:		46	4
Converting]	Factor Used:			3
	nfested Trees ated from Facto	r):	138	12
Average Boar	ed Foot Volume	per Tree:	2,691	7,263
Total Amount 1916 ar	t of Timber Kil ad 1917:	led,	371,358	87,156
Condition of	f Infestation:			
Primary	Insects:	D. brevio	omis & D. mont	icolae
Status	(1917): <u>Incre</u>	asing De	creasing Balan	nced
			уөз	
Further Data	: (seriousness ity of timbe	of present, etc.)	nt infestation	, accessibil-

There is an approximate center of infestation in vicinity of Slate Mt. lookout where the infestation may be increasing. A good view was secured of Wheeler Cr. basin where very few trees could be seen. Rock Cr. was viewed from a considerable distance. Much of it was not seen at all. Quality of yellow pine poor. 75% of infested trees spotted are accessible to roads. 102.

Unit No 63 Name: P	ilot Creek	
Period of Examination: August 30 t	o Sept. 4, 19	17
Examiner: Wagner		
Approximate Acreage: 27.000 (Range	of elevations	: 3000 to 5000
Percentage of Ownership (Forest Sei (National)	rvice: 20%	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber. (MBM)	216,000	68,000
Number of Trees Examined:	6	
Number of Trees Counted:	8	
Converting Factor Used:	4	
Number of Infested Trees (estimated from Factor):	32	5
Average Board Foot Volume per Tree:	2,691	7,263
Total Amount of Timber Killed, 1916 and 1917:	86,112	36,315
Condition of Infestation:		
Primary Insects: D. brevicomi	s & D. montio	colae
Status (1917): Increasing Decr	easing Balar	red
y	res	
Further Data: (seriousness of present ity of timber, etc.)	infestation,	accessibil-
About 30% of unit consists of cut-ov	er land. Ren	aining timber
is second grade yellow pine. No cente		
one infested tree found.		

INTENSIVE PLOT DATA

Name of Plot: No	othen Elde	rado - M	agner
Name of Plot: Zo	1 Forest Eldon	ndo	
	, R		
Description of Bou	ndaries: Exten	ive med	esurement
over the r	whole area.		
Acreage:			
Period of Examinat	ion: August	28 18 Sep	61. 18-19.7.
Period of Examinat Examiner: Albe	A Wagner		
		Sugar Yellow Pine	B.nc.
Approximate Stand	of Timber (MBM):	652525	
Number of Trees Co (Extensive work			
Number of Trees Ex	amined: Infested:	8	58390
	Abandoned: In 1917	2-	15400
	Prior to 1917	7	49690
	Total:	17	123480
Resulting Factor			
0 1	57" () (7-11-	11

104.

INTENSIVE PLOT DATA

Name of Plot: 77	orthum Ela	lorado-	Vaguer
Location: Nationa	1 Forest Cldo	rado	
	, R		
	ndaries: Exteri		
over the	whole area		
Acreage:			
Period of Examinat	ion: August	28 lo Se	61.18-1917
Examiner:	0		
		Yellow Pine	B.m.
Approximate Stand	of Timber (MBM):	1728700	
Number of Trees Co (Extensive work			
Number of Trees Ex	camined: Infested:	30	87220
	Abandoned: In 1917	22	45300
	Prior to 1917	35	101650
	Total:	87	234170
Resulting Factor			
ave.o	lia, 37.3" Ar	e. B.7n. 26	91 \$1.

DIAMETER AND VOLUME OF TREES

Northen Eldorado - Wagner.

Diameter:	Number of Trees	: Volume (board feet)	10
	Yellow Pine		
18 35n	4	: 20800	
0 14-	7	: 15800	
2 16 :	/ /	: 9700	
18 :	1	: 370	
20 :	7	: 2280	
22 :	2	: 1040	
24 :	4	2300	
26 :	3	: 1800	
28 ;	5	: 4700	
30 :	7	: 8270	
32 :	5	: 6520	
34 :	st.	: 7240	
36 :	5	: 10300	
38 :	10	: 21800	
40 :	5	: 13900	
42:		8700	
44	3	10700	
46 :	4	: 15800	
48	6	27100	
50		4700	
52	2	: 11400	
34	2	12600	
Total		6900	
		234170	
3244	:Sugar Pine	2341/	
12"			
14	A		
16	•		
18	•		
20	5		
22			7
24			105
26	: /	780	
7428		11750	
	: 1	12350	
76 30 78 32	2	25800	
34		3760	
	: 2		90
36			
38	: 2	7600	
38 40	; :	7600	
38 40 46	;	3650	
38 40 46 \$6	:	3650 5750	
38 40 46 56 58	; : 1 : 1 : 2	3650 5750	
38 40 46 56 58	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	2600 3650 5750 13180 16360	
38 40 46 56 58 60	:	2600 3650 5750 13180 16360	
38 40 46 56 60 62	:	2600 3650 5750 : /3180 : /6360 : 9300 : /8200	
38 40 46 56 58 60	:	2600 3650 5750 13180 16360	

INTENSIVE PLOT DATA

Name of Plot: Caps Crossing-1	P. P Canon	& Cat Creek
Location: National Forest Eld.	orado	
T. — , R. —	, Sec.	
Description of Boundaries: July	usive Pla	to (4)
The approximate sta	and of the	tu whole
The approximate sho Southern Eldwado is		
Yell	or pine -	905820
Jell Sug	or pine =	
Acreage: 5910		
Period of Examination: August	101820-	1917.
Period of Examination: August Examiner: Henry a. Smi	th.	
Approximate Stand of Timber (MBM):	Yellow Pine 88650	
Number of Trees Counted (Extensive work - spotted):		
Number of Trees Examined: Infested:	8	30980
Abandoned: In 1917	14	15620
Prior to 1917	14	47100
Total:	36	93700
Resulting Factor		
ave dia 339" au	Rm 21	- 41

DIAMETER AND VOLUME OF TREES

Summary Smith

Diameter:	Number of Trees :	Volume (board feet)
Drame cer:	Number of frees	voiame (board leet)
	Yellow Pine	
12" :		
14 :		
16 ;		
18 :		70
20		450
22 ;	4	590
24 :		1870
26 :	2	1100
28 :		3280
30 :		1280
32		
OI		1760
	7	3100
		1700
40		
efet		3250
4-6	3	: 10800
48	: The same of the	17500
50		: 4700
54	3	: 19300
55		7500
62		9700
Total		: 11300
1220	36	93700
	:Sugar Pine	
7 0 11		
12"		
14		•
14 16		:
14 16 18		
14 16 18 20	,	
14 16 18 20 22	:	
14 16 18 20 22 24	· :	
14 16 18 20 22 24 26	· :	
14 16 18 20 22 24 26 28		
14 16 18 20 22 24 26 28		
14 16 18 20 22 24 26 28 30 32		
14 16 18 20 22 24 26 28 30 32 34	· · · · · · · · · · · · · · · · · · ·	
14 16 18 20 22 24 26 28 30 32 34 36	· · · · · · · · · · · · · · · · · · ·	
14 16 18 20 22 24 26 28 30 32 34		
14 16 18 20 22 24 26 28 30 32 34 36 38		
14 16 18 20 22 24 26 28 30 32 34 36 38 40		: 23450
14 16 18 20 22 24 26 28 30 32 34 36 38 40		

107

INTENSIVE PLOT DATA

Name of Plot: Ca	t Creek		
Location: National	Forest Eldo	rado	
T. 97 Description of Bour	1. R. 150	c., Sec. 3	0+
Description of Boun	daries: Boun	dories.	not
definite.			
	a 124 y 5 1 X Dui		
Acreage: 2000			
Period of Examinati	on: august	10-1	917
Period of Examinati	a Sui	il !	
	f		
		Yellow Pine	Sugar Pine
Approximate Stand o	f Timber (MBM):	30000	
Number of Trees Cou (Extensive work -			
Number of Trees Exa	mined: Infested:	_3	6280
	Abandoned: In 1917	5	10190
	Prior to 1917	7	20470
	Total:		36940
Resulting Factor		0 107 =	
ave dia	a. 341" an	c. B.m. 21	163 ft.

109.

DIAMETER AND VOLUME OF TREES

Cat Creek

36 :	(board feet)
12"	
14	
16 18 20 20 22 22 24 24 2 26 7 28 7 30 30 32 34 7 36 7 38 40 7 44 7 46 7 46 7 50 7 Total Sugar Pine 12" 14 16 18 20 22 24 24 26 28 30 32 34 36 38 30 38 40 38 40 38 40 40 40 40 40 40 40 40 40 40 40 40 40	
18	
20	70
22	270
24	350
26	810
28	550
30 32 34 36 38 40 49 44 46 47 46 47 56 48 50 40 Sugar Pine 12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 38 40 38 40 38 40	680
32 :	
34	
36	760
38 40 40 44 46 46 54 50 66 7 Total Sugar Pine 12" 14 16 18 20 22 24 26 28 30 30 32 34 36 38 40	2000
40 44 46 54 50 66 70 Total Sugar Pine 12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 40	
##	
###	2-50
50 1 66 1 Fotal 30 Total 30 12" 30 14 30 18 30 20 32 24 30 28 30 30 32 34 36 38 40	300
\$6 \$1 \$72 \$3 Total Sugar Pine 12" \$14 16 \$18 20 \$22 24 \$26 28 \$30 30 \$32 34 \$36 38 \$40	7900
66 : // Total : : : : : : : : : : : : : : : : : : :	4700
Sugar Pine Sug	300
Total : Sugar Pine : 12" : 14 : 16 : 18 : 20 : 22 : 24 : 24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40 : 38 : 40 :	
Total : Sugar Pine : 12" : 14 : : : : : : : : : : : : : : : : :	940
Sugar Pine 12" 14 :	
12" : : : : : : : : : : : : : : : : : : :	
14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40 :	
14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40 :	
16 : : : : : : : : : : : : : : : : : : :	
18 : : : : : : : : : : : : : : : : : : :	
20 : : : : : : : : : : : : : : : : : : :	
22 : : : : : : : : : : : : : : : : : :	
24 : : : : : : : : : : : : : : : : : : :	
26 : : : : : : : : : : : : : : : : : : :	
28 : : : : : : : : : : : : : : : : : : :	
30 : 32 : 34 : 36 : 38 : 40 : :	
32 : : : : : : : : : : : : : : : : : : :	
34 :	
36 : : : : : : : : : : : : : : : : : : :	
38 : 40 : :	
40 :	
7	
	50
	50
	50
	50
	50
Total :	50

INTENSIVE PLOT DATA

Name of Pl	ot: Pi Pi.		
Location:	National Forest Coldon	adv.	
	T. 971. R. 14E	. Sec. 27	-33-34
Descriptio	n of Boundaries: Boccom	daries -	rot
defin	water the second of the second		
Acreage: _	1000		
Period of	Examination: August	20-19	17
Examiner:	Examination: august	ch	
		Yellow Pine	Sugar Pine
Approximat	e Stand of Timber (MBM):	15000	
	Prees Counted ve work - spotted):		
Number of	Prees Examined: Infested:		7500
	Abandoned: In 1917	6	550
	Prior to 1917		13990
	Total:	8	
Resulting 1	Factor		
	Tre. dia. 33.3" (We. B.m. 5	2755 41.
			/

P. P.

Diomotor	Nambon of Manager	Wolland (1
Diameter	: Number of Trees	: Volume (board feet)
	Vollow Dino	
12"	:Yellow Pine	
14		
16		
7.0		
0.0	•	
0.0	,	
0.4	•	
0.4		: 570
0.0		: . 550
7.0	2	: 1740
70	: / / / / / / / / / / / / / / / / / / /	: 1280
10	•	
		: 4700
	•	: 5700
	:	: 7500
A CONTRACTOR OF THE PARTY OF TH		4
	•	•
- m / /		
766	: 8	: 22040
Total	*	
	. Carana Dana	
	Sugar Pine	
וופר		
12"	Sugar Pine	
14	Thore	
14	Hore	
14 16 18	House	
14 16 18 20	None	
14 16 18 20 22	Thore	:
14 16 18 20 22 24	Thore	
14 16 18 20 22 24 26	Thoma	
14 16 18 20 22 24 26 28	Thomas	:
14 16 18 20 22 24 26 28 30	Flore	· · · · · · · · · · · · · · · · · · ·
14 16 18 20 22 24 26 28 30 32	None	
14 16 18 20 22 24 26 28 30 32 34	Flore	
14 16 18 20 22 24 26 28 30 32 34 36	Thoma	
14 16 18 20 22 24 26 28 30 32 34 36 38	7lone	
14 16 18 20 22 24 26 28 30 32 34 36 38 40	7loue	
14 16 18 20 22 24 26 28 30 32 34 36 38 40	71oue	
14 16 18 20 22 24 26 28 30 32 34 36 38 40	7loue	
14 16 18 20 22 24 26 28 30 32 34 36 38 40	7loue	

INTENSIVE PLOT DATA

Name of Plot:	aps Crossin		
Location: Nationa	al Forest Eldw	rado.	
T. 9 Description of Box	n. R. 148	. Sec. /	2+
Description of Box	indaries: Bonn	daries -	not
definite			
-			
Acreage: 1910			
Period of Examinat	ion: august	12-19	7.
Period of Examinat	my a. Sun	it	
		Yellow Pine	Sugar Pine
Approximate Stand		28650	
Number of Trees Co (Extensive work	unted - spotted):		
Number of Trees Ex	amined: Infested:	4	17200
	Abandoned: In 1917	2	4440
	Prior to 1917		
	Total:	6	21640
Resulting Factor			

ave dia 35" ave Bm. 3606 ft.

113

Capa Crossing.

	Capez	
iameter:	Number of Trees :	Volume (board feet)
	Vollow Dino	
12"	Yellow Pine	
14 :		
16 :		***
10 :		
18 :		
20 :		
22 :	1	240
24 :		Commence of the Commence of th
26 :		
28 ;		
30 :		
32 ;		· · · · · · · · · · · · · · · · · · ·
34 :		
36 :		1100
38 :		
40	and the state of t	
46 :	2	: 7500
48		3600
62		9200
210	: 6	21640
Total :	6	21640
Total		21640
Total	Sugar Pine	21640
Total	Sugar Pine	21640
Total ·		21640
12" 14	Sugar Pine	21640
12" 14 16	Sugar Pine	21640
12" 14 16 18	Sugar Pine	21640
12" 14 16 18 20	Sugar Pine Morie	
12" 14 16 18 20 22	Sugar Pine Morie	21640
12" 14 16 18 20 22 24	Sugar Pine Morie	
12" 14 16 18 20 22 24 26	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine Morie	

INTENSIVE PLOT DATA

Name of Pl	ot: Can	von	Creek	٤.	
	National F				
100001011.	r. 971.	. R.	148.	, Sec. 8	+
Description	n of Rounda	ries:	Zome	_, Sec. 8	rot
THE SHOW HE SHOW					
defini	u				
					4
Acreage: _					
Period of	Examination	: au	9. 13	19.7.	
Examiner:	Henry	a	Smit	t.	
				Yellow Pine	Sugar Pine
Approximat	te Stand of	Timber (MBM):	15000	
	Trees Countive work - S				
Number of	Trees Exami	ined: Infested:		none	
		Abandoned In 1917	:		440
		Prior to	1917	6	12640
	T	otal:		7	13080
Resulting	Factor				
an	e.dia.	33.1"	ave.	B.M. 1868	\$ f1.

Canon Cruk.

iameter:	Number of Trees	: Volume (board feet)
:	Zollow Disc	:
12"	Yellow Pine	
16 :		
18 : 20 :	-	: 180
	2	1/1/2
22 :		eteto
26 :		
28 :		•
30 :		860
200		
77.4		
7.0		*
77.0		
4.0		1700
48		. 7,00
54:		: 5700
:		•
:		
:		
232 :	~	
Total:	7	13080
10041 .		•
. (Sugar Dina	
i h	Sugar Pine	
12"	none	;
14 :	1 cone	
16 :		:
18 :		:
20 :		
22 :		;
24 :		:
0.0		
500		*
30 :		
32 :		:
32 : 34 :		•
32 : 34 : 36 :		
32 : 34 : 36 : 38 :		
32 : 34 : 36 : 38 : 40 :		
32 : 34 : 36 : 38 : 40 :		
32 : 34 : 36 : 38 : 40 :		
32 : 34 : 36 : 38 : 40 :		
32 : 34 : 36 : 38 : 40 : :		
32 : 34 : 36 : 38 : 40 : :		
32 : 34 : 36 : 38 : 40 : :		

SEQUOIA NATIONAL POREST

Infestation Units

Including The

SEQUOIA and GENERAL GRANT NATIONAL PARKS

and

Brivate Lands.

(Units 1 - 19, inclusive)

Insect Control Survey Sequoia.

REPORT

on the

INSECT SURVEY

of the

SEQUOIA NATIONAL FOREST

During the

Summer of 1917.*

January 1, 1918.

*Supplementary to the information contained in the general report of the survey and the se-called "Summary of the Data on the Infested Units". This report is prepared primarily for the information of the administrative officers of the Sequoia National Forest, and to assist the Supervisor's office in the preparation of working plans of insect control projects as they come up for consideration.

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The Field Examination

The field work was done by Messrs. Ralph Hopping of the Forest Service, and J. M. Miller, Bureau of Entomology. during the period from July 12 to August 12, 1917.

The Sequoia National Park and the Sanger Lumber Company cooperated by paying the field expenses of the examiners while on their lands.

An extensive reconnaissance method known as "topographic viewing", supplemented by more careful study of representative areas, was used in this survey. The resultant data on insect losses are of course strictly applicable only to 1917, but it is believed that for the Sequoia National Forest and the Sequoia National Park as a whole, the loss figures can be relied upon to be at least equalled during 1918 and 1919. The survey data will not make it possible to dispense with preliminary field examinations on any individual areas on which actual control work is contemplated in the years subsequent to the survey.

The main purpose of the survey was not to get detailed data on the individual areas of a character sufficiently accurate in all cases to serve as a basis for allotment estimates and working plans of control projects, but to determine in a general way:-

1. Location of areas in which the insect losses were

and still are epidemic,

- 2. Amount of loss now occurring on both epidemic and endemic areas.
- 3. Forecast of losses in the immediate future by classifying these infestations.
- 4. Division of the survey area into infestation units.
- 5. Estimate of the cost of control

The Survey Area and its Division into Units.

The area covered by the survey on this forest included the more important bodies of sugar pine and yellow pine from the northern boundary of the Tule Indian Reservation to the northern boundary of the Sequoia National Forest on Kings River. No examination was made of the large area south of Nelson Fork of Tule River and Freeman Creek of Kern River.

tion units, the location of which are shown on the map accompanying this report. The numbers and names of these units are permanent in that they will hereafter be adhered to in any work which concerns insect control. These units are control units, and were so divided because of the topographic and type barriers between them which make it reasonably certain that they can be considered separately in the formulation of any insect control policy for the Sequoia. As will be noted from the map, some of the units given in the following list are either entirely or partly within the Sequoia National Park. In some

cases, therefore, cooperative work with the Park Service will be necessary for the best results in control work. The field work in connection with the insect survey in the southern Sierras during 1917 indicates that the individual infestation or control units are more definitely isolated and separated from each other on the Sequoia National Forest and the Sequoia National Park than they are on any of the rest of the survey area. The fact, therefore, that the Sequoia units are so distinct from each other makes them exceedingly desirable for any investigative work.

Because of the close relation existing between a number of the units on the Sequoia Forest and the Park, it was thought best to list the units on both in this summary. The average figures are approximations only, but are sufficiently accurate for all ordinary purposes.

Units Entirely Within the Sequois N. Forest

Unit Number	Name	Acreage
1. 2. 3. 4. 5. 14. 15.	Nelson Fork Tule River. Lloyd Meadows. Little Kern. Middle Fork Tule River. Kern. Sequoia Station. Millwood*	15,060 9,000 56,000 13,500 15,000 16,000 14,500 10,000
16. 17. 18.	Hume. Lewis Creek. South Fork Kings River. Sugar Loaf Valley.	4,000 9,000 12,000

^{*}Small portion within General Grant National Park.

Units Entirely within Sequoia National Park

Number	Nume	Acreage
7.	South Fork Kaweah River,	10,000
8.	East Fork Kaweah River,	16,000
11.	Marble Fork Kaweah River,	11,000
12.	Cactus Creek,	6,500

Units in Both Sequoia N. F. and Sequoia National Park

Number	Name	Acresse
6.	North Fork Tule River,	8,000
9.	Salt Creek,	6,000
10.	Middle Fork Kaweah River,	24,000
13.	Stony Creek,	7,000

The 262,600 acres included in the 19 units of the preceding three lists are divided by ownership as follows:-

Ownership	Acres	Per Cent
National Forest,	152,300	58
National Parks,	68,300	26
Private.	42,000	16

The average acreage of an infestation unit on the Sequoia National Forest and Sequoia National Park is only 14,000 acres compared with 32,000 acres on the Eldorado and 55,000 acres on the Stanislaus National Forest and Yosemite National Park. The small average size of the Sequoia units is a distinct advantage in the administration of insect control projects and their investigative value.

Topographic Features of the Units

For the most part the individual units consist of fairly complete, distinct and well-defined drainage basins. units are separated from each other by high ridges, the tops of which are frequently far above timber line, or in the absence of such ridges, the pine stand of two adjoining units may be effectively separated by a belt of fir or lodgepole. By far the greater proportion of the yellow pine and sugar pine timber occurs between the elevations 4,000 feet and 6,000 feet. As the various streams, therefore, approach the San Joaquin Valley on the west, the lower limit of the pine forest is reached. Within the watersheds of the Kaweah and Tule Rivers, the commercial pine is confined to a long narrow belt, the main axis of which is north and south. The various tributaries of these two rivers are separated east and west by high ridges. To the west and below this timbered belt lie the non-forested foothills of the Sierras which border the San Joaquin Valley. On the east, the high range known as the Great Western Divide forms a barrier, the tops of which are covered with sub-alpine timber. Two rivers, however, extend through this divide; the Kings River and the Kern, whose eastern tributaries contain good stands of sugar, yellow and Jeffrey pine.

With the existing timber reconnaissance data on National Forest lands, and the almost complete lack of similar data for the private holdings and the National Park timber, it was almost impossible to arrive at reliable estimates of the sugar and yellow pine stands within the individual units. The fact, too, that in most cases the units follow topographic boundaries rather than legal subdivisions, made it still more difficult to arrive at reliable figures. In the preparation of the working plan for any individual unit or units, it will be possible for the Supervisor's office to give the matter of timber stands and the proportion of ownership far more careful attention than was possible in the preliminary tabulation of this important information for the 65 infestation units in the 1917 California insect survey. The following rough estimates include the National Forest, the National Park, and the private timber.

Unit Number	<u>Name</u>	Yellow Pine* M. ft.	Sugar Pine M. ft.
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.	Nelson Fork Tule River, Lloyd Meadows, Little Kern, Middle Fork of Tule River, Kern, North Fork of Tule River, South Fork of Kaweah River, East Fork of Kaweah River, Salt Creek, Middle Fork of Kaweah River, Marble Fork of Kaweah River, Cactus Creek, Stony Creek, Sequoia Station,	120,480 81,000 560,000 128,000 120,000 64,000 80,000 112,000 42,000 168,000 42,500 49,000 112,000	45,120 14,000 53,000 47,000 69,000 24,000 30,000 64,000 38,000 130,000 46,000 40,000 63,000

^{*}Includes Jeffrey Pine.

Unit Humber	<u>Hame</u>	Yellow Pine* M. ft.	Sugar Pine H. It.
15.	Millwood,	45.000	28,000
16.	Hume,	81,000	70.000
17.	Lewis Creek,	28.000	10.000
18.	South Fork of Kings River,	54,000	27.000
19.	Sugar Loaf Valley.	108.000	24,400
	Total volumes.	2,082,980	902,520**

^{*}Includes Jeffrey Pine.

**The actual total used in the general survey report is
895.520 M.

Yellow Pine Timber

As indicated in the previous section, the volume of yellow pine timber* included in the 19 listed infestation units of the survey is 2.082.980 M. feet. By ownership this volume is distributed as follows:

	M. ft.	Per Cent
National Forest.	1,296,488	62
Private.	293,542	14
National Parks,	492,950	24
Total.	2.082.980	100

As a study of the accompanying map will indicate, the infestation units do not by any means include all the yellow pine timber within the Sequoia National Forest. The Sequoia National Park yellow pine timber is almost entirely included within the infestation units, while within the boundaries of the Sequoia National Forest there are 315,110 M. feet of yellow pine outside of the infestation units distributed by

^{*}Includes Jeffrey Pine.

ownership about as follows:

National Forest. Private,

263,312 M. 51.798 M.

This represents about 20 per cent of the yellow pine within the Sequois National Forest. For the most part this is the yellow pine south of the Nelson Fork of Tule River and Freeman Creek of Kern River, and it may be covered in a future insect reconnaissance.

Sugar Pine Timber

Associated with the yellow pine there are the following volumes of sugar pine within the 19 infestation units, distributed by ownership as follows:

	M. ft.	Per Cent
National Forest,	506,402	57
Private,	107,718	12
National Parks*,	281.400	31
	895,520	100%

Not included in the infestation units there is an additional 71,000 M. feet of sugar pine, about three-fourths of which is National Forest timber, and one-fourth under private ownership. Just as in the case of the extra-unit yellow pine timber, most of this sugar pine timber lies in that portion of the Sequeia National Forest south of the Nelson Fork of Tule River and Freeman Creek of Kern River.

^{*}Sequoia and General Grant National Parks.

Timber Outside Infestation Units

Outside of the infestation units on the Sequoia, there are the following amounts of sugar pine and yellow pine. In general these volumes are not of as great commercial value as equivalent stands within the infestation units. Neither is it as subject to insect attacks because of the considerable intermixture of other coniferous species in the case of the larger proportion of it.

Sequois National Forest Timber Outside Infestation Units.

Ownership	Yellow Pine	Volume in M. 'Sugar Pine'	e in M. Feet Pine' Total		
Sequoia N. F.	263,312	53,198	316,510		
Alienated	51,798	19,002	70,800		
Total	315,110	72,200	397,310		

The 387 million feet of sugar pine and yellow pine outside of the infestation units and within the boundaries of the Sequoia National Forest represent less than 15% of the Government and private yellow pine and sugar pine within the Forest.

Other Timber Species

In the 1917 insect survey attention was given only

yellow pine. Jeffrey pine and sugar pine, inasmuch as it is these species which are of the greatest commercial importance and in which most of the insect damage is concentrated.

Character and Severity of the Insect Losses

It has been found convenient to classify the existing infestation in the survey area as follows:

- 1. Normal.
- 2. Spidemic.
 - A. Increasing.
 - B. Decreasing.
 - C. Balanced.

Enough attention has been given the insect problem by the forest officers of the Sequoia so that the above classification needs no explanation. The survey revealed the fact that all 19 infestation units listed in this report contain epidemic infestations in the following condition:

Increasing - - - - - - - - - - - 13 units
Decreasing - - - - - - - - - 0 "
Balanced - - - - - - 6 "

As has already been stated, 262,600 acres of the Sequoia National Park and Sequoia National Forest are included in the infestation units. In order to enable a better understanding of the significance of the insect losses, this acreage has been divided into two classes; that containing pine timber which is both commercial and accessible, and that which is commercial

but not accessible. In the commercial, accessible class* there are 126,500 acres, while in the commercial, non-accessible area there are 136,100 acres. The entire area, therefore, covered by the survey on the Sequois National Forest and Sequois National Park is involved at the present time in one of the three classes of epidemic infestation, all the pine timber of which is considered commercial, about one-half of which by area is accessible, and slightly more than half inaccessible.

The 1917 survey revealed an insect loss for the calendar year 1917 for the previously listed 19 infestation units as follows:

Ownership	Loss in M. ft.**	Per cent of Total
National Forest	5,902	61
National Park	2,432	25
Private	1,296	14
Total	9,630	100

The above pine loss of 9,630 board feet is entirely commercial timber, about two-thirds of the loss being in the

^{*}The entire survey area of the Sequoia National Park was put into this class because of the high scenic value of the timber, ranking it equal in importance with the commercial and accessible timber of the National Forest in plans for insect control work.

^{**}Sugar pine and yellow pine. Jeffrey pine is included in the yellow pine figures throughout this report.

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inaccessible pine timber of the survey area. Assuming a stumpage value of \$2.00 for the yellow pine and \$2.75 for the sugar pine, this annual loss represents timber values somewhat in excess of \$20,000. Conditions revealed by the survey indicate that this depredation has been of equal severity for a number of years preceding 1917.

The following table shows the estimated 1917 insect losses on the Sequoia Forest and Sequoia National Park, inclusive of the private lands within the Sequoia National Forest. Under the heading yellow pine is included the Jeffrey pine losses. The figures are in actual board feet.

o.! Name of Unit	ellow Pi	ne'Sugar Pin	e' Total
'Nelson Fork of Tule River	391,000	1 165,000	556,000
'Lloyd Meadows	296.000	1 37.000	1 333,000
'Little Kern	955,000	45,000	1,000,000
'Middle Fork of Tule River	391,000	1 255.000	646,000
'Kern River	258,000	1 79.000	337,000
'North Fork of Tule River	76.000	60.000	1 136.000
South Fork of Kawesh River	57,000	1 375,000	1 432,000
'East Fork of Kaweah River	263,000	300,000	* 563,000
'Salt Creek	94,000	1 19,000	113,000
'Middle Fork of Kaweah River	902,000	1 600,000	1,502,000
'Marble Fork of Kaweah River	414.000	* 330,000	744,000
'Cactus Cresk	248,000	1 240,000	488,000
'Stony Creek	248,000	1 240,000	488,000
'Sequoia Station	944,000	90,000	1,034,000
'Millwood	144,000	23,000	167,000
' Huma	406,000	105.000	• 611.000
'Lewis Creek	115,000		127,000
'South Fork of Kings River	370.000	36.000	• 406,000
'Snear Loaf Valley	53,000) 1	58,000
TOTAL	,625,000	13,005,000	9,630,000

That the insect losses during 1916 and 1917 were largely in timber of good size is indicated by the data in the following table. The figures show actual board foot volumes, and are the averages for the individual units.

Average Volume of Individual Insect-Killed Trees. (1916 and 1917)

t No.' Name of Unit	Ye	ellow Pir	e'8	ugar Pine
1 Welson Fork of Tule River	1	2.350	1	6,000
2 'Lloyd Meadows	1	1.500	1	3,000
3 'Little Kern	1	1.300	1	3.000
A 'Middle Fork of Tule River	2	2 350	1	6,000
5 'Kern River	1	1.120	1	1.370
6 'North Fork of Tule River	1	2.350	1	6.000
7 South Fork of Kaweah River	1	2.380		6.000
A 'Rest Fork of Kawesh River	1	2.350	Ť	6.000
9 'Salt Creek	1	2.360	1	6.000
10 'Middle Fork of Kaweah River	1	2.350	1	6.000
11 'Marble Fork of Kawash River	1	2.350	1	6.000
12 Cantus Creek	1	2.350	1	6.000
18 Stony Creek	1	2.350	1	4.000
14 'Sequoia Station	1	2.350	*	6.000
15 'Millwood	1	1.500	1	1.500
16 'Hume	1	2,350	1	8.000
17 !Lewis Creek	1	1,120	1	2,000
18 South Fork of Kines River	1	1,120	1	1.300
19 'Sugar Loaf Valley	1	1,300	1	

Assuming an average value of '2.00 per M. for the yellow pine and \$2.75 for the sugar pine, and allowing for an annual loss of 944 M. feet of sugar pine and yellow pine outside of the infestation units in addition to the 9.630 M. feet killed within the infestation units, the value of the sugar pine and yellow pine now killed annually by insects within the Sequoia Mational Forest and the Sequoia National Park amounts to \$23,500.

Control of Insect Losses

The 9.630,000 board feet of sugar pine, yellow pine and Jeffrey pine which is estimated to have occurred within the 19 infestation units on the Sequoia National Forest and National Park during 1917 is entirely of an epidemic nature, and in timber which is all considered commercial. The losses can, however, be divided according to whether it occurs in commercial timber which is accessible or inaccessible, and this division is as follows:

Loss in successible timber, 6,279,000 65
Loss in inaccessible timber, 3,351,000 35

These figures are significant in that they show that almost two-thirds of these insect losses are occurring in timber which is both commercial and accessible. The National Park timber cannot be considered commercial, but because of its scenic value. It is equivalent in importance with that on the National Forest.

year to year, and the changes in cost of labor and subsistence, it is impossible to foretell the cost of wiping out the epidemic infestations on the Sequoia. And then, there is the additional uncertainty of just what percentage of the infestation it will be necessary to remove, and whether one year of control work will, in all cases, suffice for the reduction of the losses to normal. Assuming a cost of 14.00 per thousand board feet for treating the infested timber, a maximum removal of 80 per cent of such timber

and that one year's work will be adequate for the purpose, the cost of control is approximately:

Sequoia National Forest*
Sequoia National Park*
Private holdings*

\$19,000.00 8,000.00 4,000.00

Total,

\$31,000.00

The administrative difficulties which would be encountered in an endeavor to clean up over 260,000 acres of infestation in a single year are not inconsiderable, even though the money were available. Further, whether or not it is perfectly safe to proceed with the insect control work unit by unit rather than cover the entire area in a single year, is not altogether evident. The Ashland Conference Plan projects may throw considerable light on this unit problem.

*Includes only attacks within the infestation units.

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Insect Control Survey J.M. Miller 134

SUMMARY OF INSECT SURVEY ON THE SEQUOIA NATIONAL FOREST

SURVEY AREA.

The area covered by the survey on this forest comprised the main commercial area of sugar pine and yellow pine from the northern boundary of Tule Indian Reservation to the northern boundary of the forest on Kings River. No examination was made of the large area south of the Nelson Fork of Tule River and Freeman Creek of Kern River.

This commercial area was divided into 19 infestation units, the location of which are shown on the map accompanying this report. The numbers, names and acreage of each unit are given in the following table. In future insect control work these units will correspond to control units, the names being used for the designations of the various projects.

No.	Name.	Acreage.
1	Nelson Fork of Tule River	15,060
2	Lloyd Meadows	9,000
3	Little Kern	56,000
4	Middle Fork of Tule River	13,500
5	Kern	15,000
6	North Fork of Tule River	8,000
7	South Fork of Kaweah River	10,000
8	East Fork of Kaweah River	16,000
9	Salt Creek	6,000
10	Middle Fork of Kaweah River	24,000
11	Marble Fork of Kaweah River	11,000
12	Cactus Creek	6,500
13	Stony Creek	7,000
14	Sequoia Station	16,000
15	Millwood	14,500
16	Hume	10,000
17	Lewis Creek	4,000
18	South Fork of Kings River	9,000
19	Sugar Loaf Valley	12.000

Total covered in the survey: 262,560 acres

PINE AREAS OUTSIDE OF THE UNITS.

The old Kern National Forest, now included in the Sequoia, was not covered in the survey although known to have epidemic infestations. Also, that part of the original Sequoia south of the Tule Indian Reservation and stands of timber where areas were largely mixed with fir and other coniferous species. While in these areas of mixed stands there are small epidemic areas, they are not now accessible and, therefore, have not been included in the units. The loss, however, has been included in the total loss for the forest on a minimum basis.

OWNERSHIP.

The only large mill in the forest is that operated by the Sanger Lumber Company in the northern part. Other large alienations consist principally of Bigtree holdings of which the Murphy-McRae tract on Redwood Mountain is the

largest. The ownership of the units is approximately as follows:

Forsst Service - 58%

National Park - 26%

Private - 16%

INSECT SURVEY.

The only cooperation on this forest received in
the survey was from the Sanger Lumber Co. The pro rata
expense was borne by this company, the Sequoia National
Park and the Forest Service. The examination was conducted
jointly by J. M. Miller of the Bureau of Entomology and
Ralph Hopping of the Forest Service during the period from
July 12 to August 2, 1917.

TOPOGRAPHIC FEATURES OF THE UNITS.

The drainage basins, which for the most part constitute the individual units, are distinct and well defined.

High ridges with a general change in timber type bound each drainage at the sources of the stream and its tributaries.

As all streams finally find their way to the San Joaquin Valley on the west, the lower timber line also forms a definite barrier. These units are nearer perfect isolated units than any others in the State. The timberline of the conifers begins at about 4,000 ft., sugar and yellow pine stands seldom occurring higher than 8,000 ft. Within the watersheds of the Kaweah and Tule Rivers the commercial pine is confined to a long narrow belt extending north and south divided east and west by high ridges separating the various tributaries. Below this belt to the west is the non-forested foothills of the Sierras bordering the San Joaquin Valley. On the east, the high range known as the Great Western Divide forms a sub-alpine barrier. Two rivers, however, extend through this divide; the Kings River and the Kern, whose tributaries to the east of it contain good stands of sugar. yellow and Jeffrey pine. Epidemics exist here as well as on the western front, especially in the pure Jeffrey pine stands.

Above these areas are red and white fir and large areas of lodgepole pine.

RELATION OF TIMBER STANDS.

The volume of sugar pine bears the relation to yellow and Jeffrey pine of about 1 to 3. In the present commercial belt, which is almost entirely covered by the units, the presence of other species is comparatively small and consists of white fir and cedar.

OCCURRENCE OF INFESTATION.

Fairly epidemic conditions exist on all the units.

On the whole there has been an increase in infestation throughout the area. A few units, however, do not seem to have increased this year.

The loss in yellow pine (Pinus ponderosa) has largely been caused by the bark beetle (Dendroctonus brevicomis), although a flathead (Melanophila gentilis) is responsible for the death of a small percentage. The Jeffrey pine (Pinus

Jeffreyi) is attacked by Dendroctonus jeffreyi with a small percentage killed by three different species, the flathead (Melanophila gentilis) and the two engraver beetles (Ips emarginatus and Ips oregoni). The sugar pines (Pinus lambertiana) is killed by Dendroctonus monticolae.

Infestation is epidemic in units 1, 2, 3, 4, 10, 11, 12, 13, 14, 17 and 18. In unit 4 there has not been a pronounced increase for a number of years. The annual loss, however, has been heavy for a long period. Evidence of old loss occurs in all units but is most conspicuous in Unit 4. There is abundant evidence that loss here has been prevalent for the last 10 years and has averaged at least one million feet per year, indicating a loss of 10 million feet of timber for the period. On Units 5, 6, 7, 8, 9, 15, 16 and 19 the infestation appears to be balanced with indications that it may become epidemic at any time.

CONTROL MEASURES.

as an advantage to any unit in the forest. Of primary importance, however, from the standpoint of the amount of loss involved are units 2 and 3 on the National Forest and units 10 and 11 on the National Park.

SUMMARY.

A summary of the timber stands and total annual loss for 1917 in sugar and yellow pine with the loss on each unit is attached.

SEQUOIA NATIONAL FOREST*

TABLE 1.

Timber Stand in M. ft. B.M.						
	Yellow Pine	Sugar Pine	Total			
Forest Service	1,559,800	559,600	2,119,400			
Alienated	345,340	126.720	472,060			
Totals:	1,905,140	686,320	2,591,460			
National Parks	492,950	281,400	774,350			
TOTALS:	2,398.090	967,720	3,365,810			
Timber St	TABLE 2. and. in M.ft. B.M	1., included in	the Survey.			
	Yellow Pine	Sugar Pine	Total			
Forest Service	1,296,488	506,402	1,802,890			
Alienated	293,542	107,718	401,260			
Totals:	1,590,030	614,120	2,204,150			
National Parks	492,950	281,400	774.350			
TOTALS:	2,082,980	895.520	2.978.500			

TABLE 3.

Estimated Insect	Losses, in M. Volume	ft.B.M. and Va Rate per M.	lues, 1917 Value
Yellow Pine Sugar Pine	7,381 3.193	\$2.00 2.75	\$14,762.00 8.780.00
Total Loss:	10,574		\$23,542.00

^{*}Includes Sequoia and General Grant National Parks

SEQUOIA NATIONAL FOREST

PINE LOSS, 1917 B.W. No. Name Yellow Pine Sugar Pine: Total 1 Nelson Fork of Tule River 391,040 165,000 556.040 2 Lloyd Meadow 295,650 37,500 333.150 3 Little Kern 954.720 45.000 990,720 4 Middle Fork of Tule River 391.040 255,000 646,040 5 Kern River 258,440 78.775 337,215 6 North Fork of Tule River 76,140 60,000 136,140 7 South Fork of Kaweah River 57,105 375.000 432,105 8 East Fork of Kaweah River 263,200 300,000 563,200 9 Salt Creek 94,000 18,750 112.750 10 Middle Fork of Kaweah River 902,400 600,000 1,502,400 11 Marble Fork of Kaweah River 413,600 330,000 743,600 12 Cactus Creek 248,160 240,000 488,160 13 Stony Creek 248.160 240,000 488,160 14 Sequoia Station 943,760 90,000 1,033,760 15 Millwood 144.000 23,437 167,437 16 Hume 405,440 105,000 510,440 17 Lewis Creek 115,304 6,250 121,554 18 South Fork of Kings River 369.767 35,750 405,517 19 Sugar Loaf Valley 52,650 none 52,650 6,624,576 Totals, in Ft. B.M.: 3,005,462 9,630,038

Includes both Government and private timber.

UNITS OF INFESTATION

Unit No.	1	Name: N	elson	Fork of	the Tule	River
Period of Ex	amination: A	ugust 23,	1917.			
Examiner:	Ralph Hoppin	ng and J.	M. Mil	ler		_
Approximate	Acreage: 15	,060 a. (Privat	e 40%, N	atl.For.	60%)
(Private: 40% Percentage of Ownership(Forest Service: 60% (National Park;						
			Yello	ow Pine	Sugar Pir	<u>1e</u>
Approximate	Stand of Timbe	er (MBM)	120,	480	45,120	
Number of Tr	ees Examined:			_		
Number of Tr	ees Counted:			52	11	
Converting F	actor Used:			4		
Number of In (estima	fested Trees ted from Facto	or):		208	44	
Average Boar	d Foot Volume	per Tree:	2,	350	6,000	
Total Amount 1916 an	of Timber Kild 1917:	lled,	488,	800	364,000	
Condition of	Infestation:					
Primary	Insects: D.	b. in Y.P.	, D.m.	in S.P.		
Status	(1917): <u>Incre</u>	easing Dec	creasi	ng Bala	nced	
				Ye	es	
Further Data: (seriousness of present infestation, accessibility of timber, etc.)						
The great	ter part of th	e infestat	ion ir	this ba	asin is or	1
patented lar	nds. A numbe	r of the i	nfest	d trees	in the	
vicinity of	Nelsons is ac	cessible.				

Unit No. 2 Name: I	loyd Meadow					
Period of Examination: July 34, 1917.						
Examiner: J. M. Miller and Ralph Hopping						
Approximate Acreage: 9,000.						
Percentage of Ownership(Forest Service: 80% (National Park;						
	Yellow Pine	Sugar Pine				
Approximate Stand of Timber (MBM)	81,000	14,000				
Number of Trees Examined:	7					
Number of Trees Counted:	73	5				
Converting Factor Used:	4					
Number of Infested Trees (estimated from Factor):	292	20				
Average Board Foot Volume per Tree:	1,500	3,000				
Total Amount of Timber Killed, 1916 and 1917:	438,000	60,000				
Condition of Infestation:						
Primary Insects: (D.brevicomis	, D. jeffreyi	& D.monticolae				
Status (1917): <u>Increasing</u> <u>Dec</u>	creasing Bala Yes					
Further Data: (seriousness of present infestation, accessibility of timber, etc.)						
Area rather inaccessible. Infe	station epiden	nie.				
Good commercial stand.						

Unit No.	3		Na	me:	Li	ttle Kern	1	
Period of	Examinat	cion:	July	19 to	22,	1917.		
Examiner:	J. M.	Miller	and	Ralph	Нор	ping		
Approximat	te Acreae	e: <u>56</u> ,	,000					
Percentage	e of Owne	ership	-(Fo	rest stional	servi		6	
					Υe	ellow Pin	e Sugar	Pine
Approximat	te Stand	of Timb	er	(MBM)		560,000	53.	000
Number of	Trees Ex	camined:				81		
Number of	Trees Co	unted:				272		6
Converting	g Factor	Used:					4	
Number of (esti	Infested imated fr		or):			1,088		24
Average Bo	oard Foot	Volume	per	Tree		1,300	3,	000
Total Amou 1916	ant of Ti and 1917		lled	,	1	,414,400	72,	000
Condition	of Infes	tation:						
Prima	ary Insec	ts:	D. ;	jeffre	yi,	Ips & M.	gentilis	
Statu	as (1917)	: Incr	easi	ng <u>D</u> e	cres	sing Ba	lanced Yes	
Further Do	ita: (ser	iousnes of timb	s of er,	prese	ent i	nfestati	on, acce	ssibil-
Almost	entirely	a Jefi	rey	pine	s tan	d. Inf	restation	has
been her	avy for s	several	year	es.	Timb	er inacce	essible a	t
Marie Stanley			444		5,539		11 6 2 3 5 1 9 5	

Unit No. 4	Name:	Mid	ddle Fork of	Tule
Period of Examination:	July 17	, 19	17.	
Examiner: Ralph Hopping	and J.	M.	Miller	
Approximate Acreage: 13	5,500.			
Percentage of Ownership	(Private (Forest (Nations	Ser		
			Yellow Pine	Sugar Pine
Approximate Stand of Timbe	r (MBM)	128,000	47,000
Number of Trees Examined:				
Number of Trees Counted:			52	17
Converting Factor Used:				4
Number of Infested Trees (estimated from Facto	r);		208	68
Average Board Foot Volume	per Tree	Θ:	2p350	6,000
Total Amount of Timber Kil 1916 and 1917:	led,		488,800	408,000
Condition of Infestation:				
Primary Insects: D.	brevicon	mis	and D. monti	colas
	asing <u>I</u>	Decr	easing Bala	nced
Further Data: (seriousness ity of timbe	of pres	sent	infestation	, accessibil-
Accessible by road. Mo	derately	у ер	oidemic.	
		St. die		

Unit No	5	Na	me:	Kern	River	
Period of	Examination	n: July	25 and	26, 1	917.	
Examiner:	J. M. N	Miller and	Ralph	Hoppir	ıg	
Approximat	e Acreage	15,000)			
Percentage	of Owners	ship(Fo	ivate: rest Se tional		95%	
				Yello	ow Pine	Sugar Pine
Approximate	e Stand of	Timber	(MBM)	120,	,000	4,000
Number of	Trees Exam	nined:			A Manager	
Number of	Trees Cour	nted:			65	23
Converting	Factor Us	sed:			1300	4
Number of (esting)	Infested T mated from				260	92
Average Bo	ard Foot V	Volume per	Tree:	1,	,120	1,370
Total Amoun	nt of Timb and 1917;	er Killed	,	291,	,200	126,040
Condition	of Infesto	tion:				
Prima	ry Insects	. D. brev	icomis,	D.mor	nt. & D.	jeffreyi
Status	s (1917):	Increasi	ng <u>Dec</u>	reasir		nced Yes
1000	ity of	usness of timber, e	etc.)	t infe	estation	, accessibil
Infesta	tion moder	ate				
					100	

Unit No	6	Name:	North Fork of	Tule River
Period of F	Examination:	July 15	, 1917.	
Examiner:	J. M. Miller a	nd Ralph	Hopping	
Approximate	e Acreage: 8	,000.		
Percentage	of Ownership	(Private (Forest (Nationa)	Service: 60	15%
			Yellow Pir	e Sugar Pine
Approximate	e Stand of Timbe	r (MBM)	64,000	14,000
Number of	Trees Examined:		1 -	1 -
Number of	Prees Counted:		12	4
Converting	Factor Used:			4
	Infested Trees mated from Facto	r):	48	6
Average Boo	ard Foot Volume	per Tree	2,350	6,000
	nt of Timber Kil and 1917:	led,	112,800	96,000
Condition	of Infestation:			
Prima	ry Insects: D.	brevicon	is and D. mor	nticolae
Status	s (1917): <u>Incre</u>	easing D	ecreasing Ba	alanced
				уез
Further Da	ta: (seriousness ity of timbe		ent infestati	ion, accessibil-
Rather	inaccessible.	Good sta	nd of timber	. Infestation
moderat	ely epidemic.			

Unit No. 7 Name	: Sou	th Fork of I	Kaweah
Period of Examination: July 15	5, 191	7.	
Examiner: J. M. Miller and Re	alph H	opping	
Approximate Acreage: 10,00	00		
Percentage of Ownership(Fores	st Ser	vice:	
		Yellow Pine	Sugar Pine
Approximate Stand of Timber (M)	BM)	80,000	30,000
Number of Trees Examined:			- 2
Number of Trees Counted:		9	25
Converting Factor Used:			4
Number of Infested Trees (" (estimated from Factor):		36/	100
Average Board Foot Volume per Tr	ree:	2,350	6,000
Total Amount of Timber Killed, 1916 and 1917:		84,600	600,000
Condition of Infestation:			
Primary Insects: D. brevio	comis	and D. mont:	icolae
Status (1917): Increasing yes	Decre	easing Bala	nced
Further Data: (seriousness of prity of timber, etc	esent	infestation	a, accessibil-
Infestation seems to be increa	asing	but not as j	ret serious.
Only reached by trail.			

weah
Sugar Pine
64,000
<u> </u>
20
4
80
6,000
480,000
lae
nced
, accessibil-

Unit No. 9 Name:	Salt Creek					
Period of Examination: July 13,	1917.					
Examiner: J. M. Miller and Ralph Hopping						
Approximate Acreage: 6,000						
Percentage of Ownership (Forest Service: 40% (National Park: 30%)						
	Yellow Pine	Sugar Pine				
Approximate Stand of Timber (MBM)	48,000	38,000				
Number of Trees Examined:						
Number of Trees Counted:	10					
Converting Factor Used:	5					
Number of Infested Trees (estimated from Factor):	50	5				
Average Board Foot Volume per Tree	2,350.	6,000				
Total Amount of Timber Killed, 1916 and 1917:	117.500	30,000				
Condition of Infestation:						
Primary Insects: D. brevicom	is and D. monti	colae				
Status (1917): Increasing D	ecreasing Bala	nced				
yes						
Further Data: (seriousness of present infestation, accessibility of timber, etc.)						
Only accessible by trail.						

Unit No. 10 Name: Mi	ddle Fork of Kaweah	
Period of Examination: July 28, 19	917.	
Examiner: J. M. Miller and Ralph	Hopping	
Approximate Acreage: 24,000		
(Private: Percentage of Ownership(Forest Se (National	ervice:	
	Yellow Pine Sugar Pine	
Approximate Stand of Timber (MBM)	168,000 /50,000	
Number of Trees Examined:		
Number of Trees Counted:	119. 40	
Converting Factor Used:	4	
Number of Infested Trees (estimated from Factor):	480 / 160	
Average Board Foot Volume per Tree:	2,350 6,000	
Total Amount of Timber Killed, 1916 and 1917:	1,128,000 960,000	
Condition of Infestation:		
Primary Insects: D. brevicomis	and D.monticolae	
Status (1917): Increasing Dec	creasing Balanced	
уев		
Further Data: (seriousness of presentity of timber, etc.)	nt infestation, accessibil	1-
Decidedly epidemic		

Unit No. 11 Name:	: Mar	ble Fork of	Kaweah
Period of Examination: July 3	30, 19	17.	
Examiner: J. M. Miller			
Approximate Acreage: 11,000			
(Private Percentage of Ownership(Forest) (Natio	st Sei	rvice:	
		Yellow Pine	Sugar Pine
Approximate Stand of Timber (M	BM)	88.000	44,000
Number of Trees Examined:			
Number of Trees Counted:		55	22
Converting Factor Used:			
Number of Infested Trees (estimated from Factor):		220.	88.
Average Board Foot Volume per T	ree:	2,350	6,000
Total Amount of Timber Killed, 1916 and 1917:		517,000	528,000
Condition of Infestation:		288.	
Primary Insects: D. brevio	comis	& D. montico	lae
Status (1917): Increasing			
yes			
Further Data: (seriousness of pity of timber, et	p <mark>rese</mark> n tc.)	t infestation	n, accessibil
Epidemic and increasing. Ac	ccessi	hle by Giant	Forest Road
a regular stage road.			

Unit No. 12 Name: C	actus Creek	
Period of Examination: August 1, 1	917.	
Examiner: J. M. Miller		
Approximate Acreage: 6,500		
(Private: Percentage of Ownership(Forest Se	rvice: Park: 100%	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	42,500	40,000
Number of Trees Examined:	none	none
Number of Trees Counted:	33	16
Converting Factor Used:	4	
Number of Infested Trees (estimated from Factor):	132	64
Average Board Foot Volume per Tree:	2,350	6,000
Total Amount of Timber Killed, 1916 and 1917:	310,200	384,000
Condition of Infestation:		
Primary Insects: D. brevicom	is & D. montic	olae
Status (1917): Increasing Dec	creasing Bala	nced
yes		
Further Data: (seriousness of presentity of timber, etc.)	nt infestation	, accessibil
Can only be reached by trail fro	m Colony Mill	on Giant
Forest Road.		
	11-2	

2350 7400 180,400 1917 NP. 2174 64 42350 1920 SP-20x4.80x4000-TP. WY4-40 Y2310

320,000 94,000 414,000

14.0.

150 400 150 000

OC HILD

Unit No. 13 N	ame:	itony Creek			
Period of Examination: Au	gust 2.	1917.			
Examiner: J. M. Miller an	d Ralph	Hopping			
Approximate Acreage: 7,000					
Percentage of Ownership(F	rivate: orest Se ational	ervice: 35% Park:	55%		
		Yellow Pine	Sugar Pine		
Approximate Stand of Timber	(MBM)	49,000	63,000		
Number of Trees Examined:		3			
Number of Trees Counted:		33	24		
Converting Factor Used:					
Number of Infested Trees (estimated from Factor)		132	96		
Average Board Foot Volume pe	r Tree:	2,350	4,000		
Total Amount of Timber Kille 1916 and 1917:	d,	310,200	384,000		
Condition of Infestation:					
Primary Insects: D. brevicomis & D. monticolae					
Status (1917): Increas	ing Dec	reasing Bala	nced		
yes					
Further Data: (seriousness o ity of timber,	f preser	nt infestation	, accessibil-		
Can be reached only by t	rail ei	ther by Giant	Forest or		
Big Meadows road.					
		-15T			

Unit No. 14 Name: Se	quoia Station	
Period of Examination: August 9 &	10, 1917.	
Examiner: J. M. Miller and Ralph	Hopping	
Approximate Acreage: 16,000		
(Private: Percentage of Ownership(Forest Se (National	rvice: 65%	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	112,000	80,000
Number of Trees Examined:	69	3
Number of Trees Counted:	130	6
Converting Factor Used:	4	
Number of Infested Trees (estimated from Factor):	520	24
Average Board Foot Volume per Tree:	2,350	6,000
Total Amount of Timber Killed, 1916 and 1917:	1,179,700	144,000
Condition of Infestation:		
Primary Insects: D. brevicomis	& D. montico	lae
Status (1917): Increasing Decr	easing Balar	nced
уев		
Further Data: (seriousness of present ity of timber, etc.)	infestation,	accessibil
Partly cut over area. Supervisor	r and ranger	reported
"not infested" spring 1917. Infest	tation fairly	epidemic.

Unit No.	15	Name:	Millwood	
Period of E	xamination:	August 4,	1917.	
Examiner: _	J. M. Mi	ller		
Approximate	Acreage: _	14,500		
Percentage	of Ownershi	(Private: p(Forest S (National	ervice: 45%	0%
			Yellow Pine	Sugar Pine
Approximate	stand of T	imber (MBM)	45,000	28,000
Number of T	rees Examin	ed:	1	2
Number of T	rees Counte	d:	24	5
Converting	Factor Used		5	
	Infested Tre		120	25
Average Boa	ard Foot Vol	ume per Tree	1,500	1,500
Total Amour 1916	nt of Timber and 1917:	Killed,	180,000	37,500
Condition	of Infestati	on:		
Prima	ry Insects:	D. brevicomi	s & D. montico	lae
Status	s (1917): 1	Increasing D	ecreasing Bala	anced
		уев		
Further Da	ta: (serious	sness of prestimber, etc.)	ent infestation	n, accessibil-
Largely	cutover lan	d. Infestati	ion mostly at 1	ow elevations
in isola	ated patches	of timber.		
	//_UTDALA			+

Unit No Name: Ge	n. Grant Nationa	l Park
Period of Examination: August 21, 191	744 4, 2937	and the state of t
Examiner: J. M. Miller		
Approximate Acreage: 2560		personal harmonic and a second
(Private:		
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	81,000	76,000
Number of Trees Examined:	2	2
Number of Trees Counted:	2 70	2
Converting Factor Used:	2	4
Insect-killed Number of Factor Trees, 1916,1917 (estimated from Factor):	4 60	4
Average Board Foot Volume per Tree:	2350	4000
Total Amount of Timber Killed, 1916 and 1917:	9,400	16,000
Candition of Infestation:		
Primary Insects:	sis & D. monti	colas
Status (1917): Increasing Deci	easing Balar	ced
705		
Further Data: (seriousness of present ity of timber, etc.)	t infestation,	accessibil-
Two infested sugar pine marked just e	east of the Admi:	nistrative site.
Both of trees had been injured by win	nd falls. The o	ther two trees
examined were Jeffrey pine. Condition	on of infestation	n is not epidemic
but the treatment of the more access	ible infested tr	ees is recommended.
19	127)

Jnit No. 16 Name:	Hume
Period of Examination: August 3	3 and 4, 1917.
Examiner: J. M. Miller	
Approximate Acreage: 10,000	
Percentage of Ownership (Forest	se: 85%; Service: 15%; all Park;
	Yellow Pine Sugar Pine
Approximate Stand of Timber (MBM	(i) 81,000 70,000
Number of Trees Examined:	10 2
Number of Trees Counted:	70 14
Converting Factor Used:	4
Number of Infested Trees (estimated from Factor):	280 56
Average Board Foot Volume per Tre	2.350 1.000 3.000
Total Amount of Timber Killed, 1916 and 1917:	506,800 168,000
Condition of Infestation:	
Primary Insects: D. brevice	omis & D. monticolae
Status (1917): Increasing	Decreasing Balanced
	
Further Data: (seriousness of pre- ity of timber, etc.	
About 50% cut over. Good a	accessible commercial timber

Unit No. 17	Name:	Lewis Creek	
Period of Examination: _	August 3	, 1917.	
Examiner: Ralph He	opping		
Approximate Acreage:	4,000		
Percentage of Ownership-	(Private (Forest (Nationa	Service: 100%	
		Yellow Pine	Sugar Pine
Approximate Stand of Tim	nber (MBM)	28,000	/0.000
Number of Trees Examined	l:	-	
Number of Trees Counted:		29	
Converting Factor Used:			4
Number of Infested Trees (estimated from Fac		116	5
Average Board Foot Volum	ne per Tree	: 1,120	2,000
Total Amount of Timber P 1916 and 1917:	Killed,	129,920	10,000
Condition of Infestation	1:		
Primary Insects:	D. brevicon	nis and D. mont	icolae
Status (1917): Inc	reasing D	ecreasing Bala	anced
	yes		
Further Data: (seriousne ity of time	ess of pres	ent infestation	n, accessibil-
A small basin adjo	ining the M	Cings Canyon.	Commercial
but inaccessible.			
	Valence Agent.		

Unit No. 18 Name:	South Fork of	Kings River
Period of Examination: August 4	,5,6, 1917.	
Examiner: Ralph Hopping		
Approximate Acreage: 9,000.		
Percentage of Ownership(Forest (National	e: 5% Service: 95% al Park;	
	Yellow Pir	ne Sugar Pine
Approximate Stand of Timber (MBM	54,000	27,000
Number of Trees Examined:		
Number of Trees Counted:	93	11
Converting Factor Used:		4
Number of Infested Trees (estimated from Factor):	372	44
Average Board Foot Volume per Tre	e: <u>1,120</u>	1,300
Total Amount of Timber Killed, 1916 and 1917:	416,640	57,200
Condition of Infestation:		
Primary Insects: D. brevice	omis & D. mont	cicolae
Status (1917): Increasing	Decreasing B	alanced
уes		
Further Data: (seriousness of preity of timber, etc.		ion, accessibil-
This area was inspected by Hop	ping in 1913.	The infestation
since then has been continuous as	nd increasing	steadily.

Unit No. 19 Name: Sugar Loaf Valley
Period of Examination: July, 1913
Examiner: Ralph Hopping
Approximate Acreage: 12,000
(Private: 10% Percentage of Ownership(Forest Service: 90% (National Park:
Yellow Pine Sugar Pine
Approximate Stand of Timber (MBM) 108,000 24.400
Number of Trees Examined:
Number of Trees Counted:
Converting Factor Used:
Number of Infested Trees (estimated from Factor): 60
Average Board Foot Volume per Tree: 1,300 -
Total Amount of Timber Killed, 78,000 -
Condition of Infestation:
Primary Insects: D. brevicomis & D. jeffreyi
Status (1917): Increasing Decreasing Balanced
yes
Further Data: (seriousness of present infestation, accessibil ity of timber, etc.)
The estimate on this area is based upon a similar area
(Little Kern) and the known infestation in 1913.

147.

INTENSIVE PLOT DATA

Name of Plot: Grey Meado	er	
Location: National Forest Segue	ora	
r. 20S, R. 32	€ , Sec	
Description of Boundaries: Juck	ides bour	day
as for attached map.		
Acreage: /3/0		
Period of Examination: July 20 Examiner: J. 711 7 11116 7	-21-19	7
Examiner: In Titleler 7	Ralph Ho,	bpcieg .
	Jeffrey Pine	B.m. Sugar Pine
Approximate Stand of Timber (MBM):	13100	
Number of Trees Counted (Extensive work - spotted):	17	
Number of Trees Examined: Infested:	31	43990
Abandoned: In 1917	4	4760
Prior to 1917	34	89760
Total:	69	41010
Resulting Factor		4
average diameter 29.8"	ave. B.711.	1301 41

DIAMETER AND VOLUME OF TREES

Grey Meadows.

iameter	: Number of Trees		Volume (board feet)
		:	, or and (board rock)
	:Yellow Pine		
12"		:	
14		: .	
16			
	: 4		830
20	: 4	:	1280
22	3		940
~ 7	10	:	4920
26		;	2650
28		:	6440
70	. 8	:	9780
The second of th	7	:	10570
7.0	: 4,		9280
50	: 4	;	8000
	3,	: -	7500
40	: 4	:	11400
	: A Part of the second	:	3700
	2	:	3700
	<u> </u>		8800
2051			gast
7056 Total	69		89760
7056 Total	69	:	89760
7.056 Total			89760
7056 Total	Sugar Pine		89760
Total			89760
2056 Total	Sugar Pine		89760
12" 14	Sugar Pine	· · · · · · · · · · · · · · · · · · ·	89760
12" 14 16	Sugar Pine		89760
12" 14 16 18 20	Sugar Pine		89760
12" 14 16 18	Sugar Pine None		89760
12" 14 16 18 20 22 24	Sugar Pine Nove		89760
12" 14 16 18 20 22 24 26	Sugar Pine Nous		89760
12" 14 16 18 20 22 24 26 28	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36	Sugar Pine Nous		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine None		89760
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine None		89760

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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SER OF

Sequesia National Forest, State of California Land District

Sec. 7.20% R. 32% III. D. Mer. Area 1310 acres. Scale of inches 1 miles

Field work by Miller + Happing Variation

Date July 20-20-197 Platted by Herring

Cose designation Grey Meadow.

Legend

Legend

Legend

Legend

Teffrey Pine.

60. 61. 553 57

24 44 35. 34 35. 34 35. 34 35. 34 35. 34 35. 34

INTENSIVE PLOT DATA

Name of Plot: Seguroia Stat	ion		
Name of Plot:			
Location: National Forest Segue	ca		
T. 14S, R. 28E	Sec.		
Description of Boundaries: His a	rea is be	nunded	
on the worth by a rocky bl	eff on ite	e east by l	tu
Big Mdus road on the south	les etre la	ter road lo	
its junction with the Bill &	fort road o	and on the	
its junction was the hard	C. 1 Pa	(Tail a	,
west by the Bill Hart wad.	Frank Park	e de la constante de la consta	77
stee old Double Stoad to the	crocky blu	ff on the n	oru
Acreage: /6/0			
Period of Examination: August Examiner: J. M. Miller + Ko	9-10-19	717.	
Examiner: I. M. Miller + Ro	eph Hope	bing.	
	Yellow Pine	Sugar Pine	
Approximate Stand of Timber (MBM):	6395		
Number of Trees Counted (Extensive work - spotted):	71		
Number of Trees Examined: Infested:	70	65260	
Abandoned: In 1917		74310	
Prior to 1917	27	51350	
Total:	60	140920	
Resulting Factor		3	
ave dia 34.8" ave. 1.	3.7m. 2348	41.	

INTENSIVE PLOT DATA

Name of Plot: Se	guoia Sta	etion	
Location: National	Forest Segu	evia.	
T. 14	S, R. 288		
Description of Bound	daries: See -	real of de	scription
on yellow	pine slue	4.	
			Title 10 s
Acreage: 1610		4	
Period of Examination	on: aug. 9	-10-191	7
Examiner: 2.711.	miller of	alph He	sping.
		Sugar. Yellow Pine	Sugar Pine
Approximate Stand of	f Timber (MBM):	1034	
Number of Trees Cour (Extensive work -			
Number of Trees Exam	mined: Infested:	/	1910
	Abandoned: In 1917	,	8290
	Prior to 1917		8860
	Potal:	-3	19060
Resulting Factor		\\	3
Ave dia	. 52.6" ave	B.M. 638	-3 ft.

152.

DIAMETER AND VOLUME OF TREES

Seguvia Station

	X	Station
iameter:	Number of Trees	: Volume (board feet)
	Vallaw Dina	
12"	Yellow Pine	
14 :		
16 : 18 :		: 460
20 :	2.	
22 :	1	: 290
	4	
24 :	7	: 7930
26 : 28 :	4	: 2970
	-	: 4660
30 :	7- 4- 2	
32 ;	7	2250
34 :	3	: 5.760
36 :	6	: /2600
38 :		: /5300
40 :	-3	: 9500
42:	5	: 16200
44:		: 3700
46 :	2	: 7900
48:	7	: 9300
50 :	3	: 18000
54:	7	: 15200
66 :		, , , , , , , , , , , , , , , , , , , ,
Total :		
2088	Ç .	140920
	Sugar Pine	a g
	Sugar Pine	
12"	Sugar Pine	
12"	Sugar Pine	
12" 14 16	Sugar Pine	
12" 14 16 18	Sugar Pine	
12" 14 16 18 20	Sugar Pine	
12" 14 16 18 20 22		
12" 14 16 18 20 22 24		
12" 14 16 18 20 22 24 26		
12" 14 16 18 20 22 24 26 28		
12" : 14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30		
12" : 14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30 : 32		
12" : 14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30 : 32 : 34		
12" 14 16 18 20 22 24 26 28 30 32 34 36		1910
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" : 14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40		1910
12" : 14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40 : 60 : 60 : 60 : 60 : 60 : 60 : 60		1910
12" : 14		1910
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 60		1910
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 60		1910
12" : 14 : 16 : 18 : 20 : 22 : 24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40 : 60 : 60 : 60 : 60 : 60 : 60 : 60		1910
12" : 14		1910 : 8290 : 88'60
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 60		1910

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Sec. 7.145 R. 28 E. M. D. Mer. Area 1610 acres. Scale 4 inches 1 mile. Grant Park \$33 Legend

INTENSIVE PLOT DATA

Name of Plot: Kings River		
Location: National Forest Seg.		
T. 13S, R. 30-31		
Description of Boundaries: This		
part of Kings Canon. Be	ginning	of Cedar
Grove Hotel & Sheep Crack		
mestern boundaries, etu		
the northern & southern		
line at the bridge below Eastern boundary.		
Acreage: 1280 F		
Period of Examination: Aug. 36	8 aug. 6 -	1917.
Examiner: Kaeph Hopping	9	
	Yellow Pine	A Control of State of
Approximate Stand of Timber (MBM):	6000	
Number of Trees Counted (Extensive work - spotted):	16	
Number of Trees Examined: Infested:	35	56060
Abandoned:		
In 1917	37	42490
Prior to 1917	48	40700
Total:	120	138.750
Resulting Factor		7
ave. dia. 28.3" ave. 1.	B.M. 1156.	fi.

155.

INTENSIVE PLOT DATA

Name of Plot:	mig River		
Location: Nation	nal Forest Segn	ivia	
	13S., R. 3d-31		
	undaries: See 2		
	llow pine.		
Acreage: 1280			
Period of Examina	tion: aug. 3	15 aug. 6	- 1917.
Examiner: Kalp	tion: Aug. 3 l		
		Yellow Pine	Sugar Pine
Approximate Stand		400	
Number of Trees Co (Extensive work	ounted - spotted):	-	
Number of Trees Ex	camined: Infested:		940
	Abandoned: In 1917		3560
	Prior to 1917	3	5100
	Total:	7	9600
Resulting Factor			7
ave. dia.	31.7" ave.	B.m. 13	71 fr.

DIAMETER AND VOLUME OF TREES

Kings River.

	/	
Diameter:	Number of Trees	: Volume (board feet)
8.43 5.43	Yellow Pine	
12"	Tellow blue	
14 :		
16 :		•
18	8	1390
20 :	9	: 2760
22 :		: 6070
24 :	14	: 7580
26 :		: 10650
28 :		: 4900
30 :	15	: 17360
32 :	5	: '9540
34 :	7	: 13120
36 :		: 18300
38 :		: 2900
40	9	: 26'0.00
42		: 3300
44	7	: 4100
46	3	: 1380
60		: 9900
		•
3400	120	: 138750
Total		
		,
	:Sugar Pine	
	ASTRONOMICS TO A STATE OF THE S	
12"		
14		
16		
	•	
18		
20		250
20 22		250
20 22 24		250
20 22 24 26		
20 22 24 26 28		780
20 22 24 26 28 30		
20 22 24 26 28 30 32 34		: : 780 : 940
20 22 24 26 28 30 32 34 36	:	780
20 22 24 26 28 30 32 34 36 38	:	780 940 2980
20 22 24 26 28 30 32 34 36		: : 780 : 940
20 22 24 26 28 30 32 34 36 38		780 940 2980
20 22 24 26 28 30 32 34 36 38 40	2	780 940 2980
20 22 24 26 28 30 32 34 36 38		780 940 2980

Hopping. Variation Date King 3-6 197 Platted by Hopping

/(11(4)5 ((1)(2))			
	Legend		
Jest Comment of the C	· Yellow Pine. X Sugar Pine.		
(R.30E	,	R.31E	
		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
69.67	Can n Wall.		
Vii - 116			
115 111 100	.71		
13.		18	
	10. South	Fork Kings Kive	5. 31.3E-81
3:4 .8		113	7
		· · · · · · · · ·	
Canon VV	25 X X Z 16		
	****		18 19

						· Yei	geni llow T igar								
															ر -
													61.1	4515 60	• 42-
	84.		8-6.			Can	or. V					64	63		
<u> </u>		85.		7. 87				108.	./00	group	4 4 4 8 m	6		0141	
		South F	PKKin.	88' Is Rive	•	90 - 91 93 27 - 11	.74	1018.10	group	18" /	38	39			
			• 2.7-				26	35	. X3		• 37				
•							Cano	1. 19	Roaring						
									River						

160.

INTENSIVE PLOT DATA

Name of Plot: Extersive - 7.	niles of	opping.	
Location: National Forest Segn	ivia		
m _ p &	2		
Description of Boundaries: Extern	sive nu	asuschien	/
in the Signia			
0			
		Asset Control	
Acreage:			
Period of Examination: July +	august	1917	
Examiner: J. M. Miller & A	alph A.	phing.	
Period of Examination: July 7	Sugar. Yellow Pine	B.7M. Sugar Pine	
Approximate Stand of Timber (MBM):			
Number of Trees Counted . (Extensive work - spotted):			
Number of Trees Examined: Infested:	7	27080	
Abandoned: In 1917			
Prior to 1917	7	3930	
Total:	9	38980	
esulting Factor			
ave. dia . 41.5" a	ve B.M. 3	445 fl	

INTENSIVE PLOT DATA

Name of Plot: Ex	tensive - M	iller & A	opping
Name of Plot: 6x Location: National	Forest Segue	oia	
т. —	, R	, Sec	
T	daries: Extern	ive niea	surement
on the Seg	moio.		
Acreage:			
Period of Examinati Examiner: 711.	on: July & c	rugust 1	9.7
Examiner: \$711.	miller 9 1	alph Hop	thing.
		Yellow Pine	13.776.
Approximate Stand o	f Timber (MBM):		
Number of Trees Cou (Extensive work -			
Number of Trees Exa	mined: Infested:	9	34120
	Abandoned: In 1917	12	20310
	Prior to 1917	4	5820
	Total:	25	60250
Resulting Factor			
and dia .	34.4" ave	B.m. 24	40 11

161.

DIAMETER AND VOLUME OF TREES

Extensive Miller & Hopping.

Diameter: Number of Trees: Volume (board feet) V 12"	Tark the second	Chairme	
12"	Diameter:	Number of Trees	: Volume (board feet)
12"			
14 16			
16			: 40
18			
20			60
22	18 :		
24			: 90
26	22 :		
28		2	: 1140
30 : 38 : 2 : 3570 34 : 2 : 3740 36 : 2 : 4300 38 : 40 : 3 : 9500 44 : 1 : 3700 45 : 1 : 5700 50 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5600 57 : 1 : 5600 58 : 1 : 5600 59 : 1 : 5600 50 : 1 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50 : 5700 50		4	: 2300
32			860
34 : 2 : 3240 36 : 2 : 4300 38 : 40 : 3 : 9500 44 : 1 : 3700 48 : 1 : 5700 50 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 57 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 58 : 1 : 5700 59 : 1 : 5700 5	30 :		
36	7.4	2	
38 : 40 : 3. : 9500 44 : 1 : 3700 48 : 1 : 5700 50 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 56 : 1 : 5700 57 : 1 : 5700 57 : 1 : 5700 57 :			: 3240
40	36 :	2	: 4300
##			
##			
STO STO 0 STO			: 3700
\$\frac{\frac			
\$6 : 1 6900 \$60 : 25 60250 Total : 60250 Sugar Pine : 60250 12" : 14 : 16 : 18 : 18 : 20 : 20 : 22 : 1 : 3/0 22 : 1 : 3/0 24 : 1 : 630 26 : 28 : 30 : 940 30 : 1 : 940 32 : 34 : 32 : 34 : 366 : 1 : 1730 38 : 1 : 1730 40 : 40 : 40 : 40 : 40 : 41 : 10 : 10 :		1	
Secondary Secondary Secondary Secondary Secondary Sugar Pine Sugar Pi			
See 25 60250 Total 60250 12" 60250 14 14 16 18 20 22 24 1 530 26 28 30 1 940 32 34 36 1 1730 38 1 2200 40 200 44 1 2950 47 1 2950 48 1 2000 40 1 2950 47 1 2300 70 1 12390			
Total : : : : : : : : :			: 6600
Sugar Pine	860	25	: 60250
12" 14 16 18 20 22 1	Total :		•
12" 14 16 18 20 22 1		MECHANICATION CONTROL AND	
14 : : : : : : : : : : : : : : : : : : :		Sugar Pine	
14 : : : : : : : : : : : : : : : : : : :	:		
16 : 18 : 20 : 22 : : 3/0 24 : ! 530 26 : : . 30 : ! 940 32 : . . 34 : . . 36 : ! . . 38 : ! . . . 40 : . </td <td></td> <td></td> <td>•</td>			•
18 : : : : : : : : : : : : : : : : : : :		All fire and the second	*
20 : 3/0 22 : 1 : 3/0 24 : 1 : 530 26 :			
22 1 3/0 24 1 530 26 30 940 32 940 34 1 36 1/730 38 1/200 40 1/200 47 1/200 48 1/2390 1/2390 1/2390	18 :		
24 1 530 28 30 940 32 34 730 36 1 730 38 1 7200 40 2200 47 1 7950 48 1 3660 62 1 6300 70 1 7390	20 :		,
26 28 30 30 40 31 2750 48 40 49 41 36666 62 41 27390	22 :	1	: 3/0
28 30 31 32 34 36 38 1 1730 38 40 40 40 41 3660 62 1 3660 62 1 12390	24 :	1	: 530
30 : 940 32 : 7730 34 : 7730 38 : 1 2200 40 : 2950 41 : 3660 62 : 1 6300 70 : 12390	26 :		:
32 34 36 38 1 2200 40 40 41 42 43 44 45 46 47 48 48 49 40 40 40 40 40 40 40 40 40 40	28 :		;
34 :	30 :		: 940
36 : 1730 38 : 12200 40 : 2950 48 : 3660 62 : 6300 70 : 12390	32 :	***	:
38	34 :		* * * * * * * * * * * * * * * * * * *
40 : 2950 48 : 1 : 3660 62 : 1 : 6300 70 : 1 : 12390	36 :		
44 1 2950 48 1 3660 62 1 6300 70 1 12390	38 :		: 2200
48 : 3660 62 : 6300 70 : 1 : 12390			:
62 : 1 : 6300 70 : 1 : 12390			
62 : 1 : 6300 70 : 1 : 12390			
			: 6300
	70 :	1	: 12390
374 9 31010 Total	:		
374 : 9 : 31010 Total :	0.435 at 1.53		
Total : :			
	374 :	9	: 310/0

175

INTENSIVE PLOT DATA

Name of Plot: Location: National	yd a Big Md	ws. + Little	Ken
Location: Nationa	1 Forest Segu	oia	
	, R		
Description of Bou			
in the Segn			
Acreage:			
Period of Examinat	ion: Luky + C	luquet ,	1917
Period of Examinat Examiner: 9.711	Miller 4	Ralph H	phing.
		Jeffrey Yellow Pine	B.m. Sugar Pine
Approximate Stand	of Timber (MBM):		
Number of Trees Cor (Extensive work			
Number of Trees Exa	emined: Infested:	13	36260
	Abandoned: In 1917	4	17600
	Prior to 1917	7	20590
	Total:	24	74450
Resulting Factor			
ave di	a. 39.1" ave.	B.n. 310	2 ft.

163.

DIAMETER AND VOLUME OF TREES

Extensive-Miller & Hopping.

Diameter:		: Volume (board feet)
	Jeffrey Yellow Pine	
	: Yellow Pine	
12" :		
14		White has a property of the second services.
16		The second secon
18		230
20		
22		
24		440
26		: 1400
28	/	: 860
30		
32		
34	2	: 3520
36	3	: 6600
38	2	: 4600
40		2900
48	4	: 20400
50	:	5200
52	2	12600
54		5700
42	STOREGE STREET, STREET	10000
removed to the last		
Tótal		
	Sugar Pine	
	:Sugar Pine	
	:Sugar Pine	
12"	:Sugar Pine	
12" 14	:Sugar Pine	
12" 14 16		
12" 14 16 18		
12" 14 16 18 20		
12" 14 16 18 20 22		
12" 14 16 18 20 22 24 26		
12" 14 16 18 20 22 24 26		
12" 14 16 18 20 22 24 26 28 30		
12" 14 16 18 20 22 24 26 28 30 32		
12" 14 16 18 20 22 24 26 28 30 32		
12" 14 16 18 20 22 24 26 28 30 32 34 36		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		

STANISLAUS NATIONAL FOREST

Infestation Units

Including the

YOSEMITE NATIONAL PARK and Private Timber Lends.

(Units 39 - 51, inclusive)

STANISLAUS NATIONAL FOREST

TABLE 1.
Timber Stand in M. ft. B.M.

Timber	Stand in M. ft	B.M.	
Ye	ellow Pine	Sugar Pine	Total
Forest Service Alienated	2,904,000 2,196,000	1,725,000	4,629,000 3,199,000
Totals:	5,100,000	2,728,000	7,828,000
Alienated(outside) National Park	101,000	49,000 166,000	150,000 468,000
TOTALS:	5,503,000	2,943,000	8,446,000
	TABLE 2 included in the control of the control o	ne Survey, in M. Sugar Pine	ft.B.M. Total
Forest Service Alienated	2,178,000 1,976,000	1,294,000 902,000	3,472,000 2,878,000
Totals:	4,154,000	2,196,000	6,350,000
Alienated (outside) National Park	101,000 302,000	49,000 166,000	150,000 468,000
TOTALS:	4,557,000	2,411,000	6,968,000
Estimated Insec	TABLE 3.	in M. ft. B.M.	& Values
	<u>Volume</u>	Rate per M.	Value
Yellow Pine Sugar Pine	3,945 1,264	\$2.00 2.75	\$7,890 3.476
Total Loss	5,209		\$11,366

^{*}Refers to the Yosemite National Park and only that portion included in the infestation units.

STANISLAUS NATIONAL FOREST *

PINE LOSS, 1917.

No.		Name	LOSS, 1917. : Ft	. В.М.	
	:		Yellow Pine :	Sugar Pi	ne:Total
39		Bullock	150,000	119,000	269,000
40		Bower Cave	292,500	52,500	345,000
41		Middle Fork Tuolumne	90,000	17,500	108,000
42		Lake Eleanor	95,000	10,500	105,000
43		Clavey River	205,000	203,000	408,000
44		Tuolumne	107,500	19,530	127,000
45	7	Strawberry	272,360	70,680	343,000
46		Mt. Knight - Cow Creek	54,472	70,680	125,000
47		Grohl	329,466	117,800	447,000
48		South Grove	187,627	53,010	241,000
49		Calaveras	463,016	88,350	551,000
50		Blue Mountain	366,176	58,900	425,000
51		Mokelumne	644.591	153.140	798.000
		Totals, in Ft. B.M	I. 3,257,708	1,034,590	4,292,000

^{*}Includes both Government and private timber.

Unit No. 40 Name:	Bower Cave				
Period of Examination: June, Jul	у 1917				
Examiner: W.E. Glendenning - J.M.					
Approximate Acreage: 61000					
Range of elevations -2000 to 5000 (Private: 20% Percentage of Ownership(Forest Service: 80% (National Park;					
	Yellow Pine	Sugar Pine			
Approximate Stand of Timber (MBM)	415.000	73,000			
Number of Trees Examined:					
Number of Trees Counted:	68	1.5			
Converting Factor Used:	3				
Number of Infested Trees (estimated from Factor):	204	15			
Average Board Foot Volume per Tree	2,000	7,000			
Total Amount of Timber Killed, 1916 and 1917:	408,000	105,000			
Condition of Infestation:					
Primary Insects: D. brevicon	is & D. montico	lae			
Status (1917): Increasing De	ecreasing Balan	nced			
	yes				
Further Data: (seriousness of presents of timber, etc.)	ent infestation	, accessibil-			
This area includes the we	estern border o	the yellow pine			
belt and the greater part of the timber is of an inferior quality,					
grawing at elevations between 2000	and 4000 feet.	It does not			
form a natural topographic unit.					
completely by reconnaissance but a old abandoned ones a low factor is	nost of the used. No cent	rees Spotted were			

Unit No Name:	Middle Fork of the	Tuolume
Period of Examination: June, 191	7	
Examiner: W. E. Glendenning		
Approximate Acreage: 69.000 (Ele	vations: 3000-6500)
Percentage of Ownership (Forest S (National	Service: 25%	
	Yellow Pine Su	gar Pine
Approximate Stand of Timber (MBM)	266,000 3	26.000
Number of Trees Examined:		
Number of Trees Counted:	48	3
Converting Factor Used:	1.5	
Number of Infested Trees (estimated from Factor):	63	5
Average Board Foot Volume per Tree:	2,000	7.000
Total Amount of Timber Killed, 1916 and 1917:	126.000	30 006 35,000
Condition of Infestation:		
Primary Insects: D. brevic	omis and D. montic	olae
Status (1917): <u>Increasing</u> <u>De</u>	creasing Balance	<u>i</u>
	yes	
Further Data: (seriousness of prese ity of timber, etc.)	nt infestation, ac	ccessibil-
No further data available.		

Unit No. 42 Name:	Lake Eleanor				
Period of Examination: June, 3	1917				
Examiner: W. E. Glendenning					
Approximate Acreage: 45,000 (I	Range elevations: 3500-70001)				
Percentage of Ownership (Forest	te: 10% t Service: 30% nal Park; 60%				
	Yellow Pine Sugar Pine				
Approximate Stand of Timber (MBM	M) 283.000 32.000				
Number of Trees Examined:	-488				
Number of Trees Counted:	33 1				
Converting Factor Used:	3				
Number of Infested Trees (estimated from Factor):	66 3				
Average Board Foot Volume per Tre	ee: 2.0 00 7.000				
Total Amount of Timber Killed, 1916 and 1917:	132,000 21,000				
Condition of Infestation:					
Primary Insects: D. brevi	comis, D. jeffreyi, D. monticols				
Status (1917): <u>Increasing</u>					
Further Data: (seriousness of present infestation, accessibility of timber, etc.)					
The only part of this unit	where the infestation appears				
to be of any consequence is on t	he watershed of the Cherry River				
Here, however, it is very light	and not centered.				

Unit No	0.	43	Name		Clavey R	iver		
Period	of E	examination:	July,	1917.				
		W. E. Glendenn						
Approx	imate	Acreage: 98.	000					
		of Ownership	(Priv	vate: est Sei ional 1	cvice:	55%		
					Yellow I	Pine	Sugar	Pine
Approx	imate	e Stand of Timb	er ()	MBM)	488,00	00	262,0	000
Number	of!	Frees Examined:						
Number	of!	Frees Counted:			72	8		29
Conver	ting	Factor Used:			_	2		
Number	of of of	Infested Trees mated from Fact	or):		144	4		58
Averag	ge Bo	ard Foot Volume	per	Tree:	2.000	0	7.	000
Total	Amou L916	nt of Timber Ki and 1917:	lled,		288.00	0	406,	000
		of Infestation:						
F	Prima	ry Insects:	D. bre	vicomi	s and D.	mont	icolae	
S	statu	s (1917): <u>Incr</u>	reasin	g Dec	reasing	Bala	nced	
	100					Э	68	
Furthe	er Da	ta: (seriousnes	ss of per, e	presentc.)	t infest	ation	, acce	ssibil

The western half of this unit is cut-over land. East of the Clavey
River the infestation is very light and in view of the fact that the
Westeide Lumber Co. plans to continue logging within this tract in
the near future, the present infestation cannot be considered serious.

171.

Unit No.	44	Name:	Tuolume	
Period of Ex	amination:	1917		
Examiner:	Estimated by	Ralph Ho	pping	
Approximate A	Acreage: 23.0	000		
Percentage of	Ownership	(Private: (Forest Se (National	rvice: 60%	
			Yellow Pine	Sugar Pine
Approximate S	Stand of Timber	r (MBM)	195.000	35,000
Number of Tre	es Examined:		none	none
Number of Tre	es Counted:		none	none
Converting Fo	ctor Used:			
Number of Inf (estimat	ested Trees ed from Factor	c):	76	5-1/2
Average Board	Foot Volume	per Tree:	2,000	7.000
Total Amount 1916 and	of Timber Kill 1917: Esti	led, ma ted- -	151,746	39,060
Condition of	Infestation:			
Primary	Insects: D.br	evicomis 8	& D. monticols	le l
Status (1917): <u>Incres</u>	sing Dec	reasing Balar	nced
		- Unknow	A 40 - 10 - 10 - 10	
Further Data:	(seriousness ity of timber	of present, etc.)	t infestation,	accessibil-
Includes	the western bo	rder of th	he pine belt.	Not examined
on this sur	vey but very p	robably co	ontains some i	nfestation.
Estimated	on Bower Cave	unit.		

Unit No. 45	Name:	Strawberr	r (St	enislaus	N.F.)
Period of Examination:	July 21-	July 27, inc	3., 19	17.	
Examiner: A. J. Jaenicke					
Approximate Acreage:	50,000				
Percentage of Ownership		s: 45° Service: al Park;	55%		
		Yellow	Pine	Sugar Pi	ne
Approximate Stand of Timbe	er (MBM)	890	000	90,000	
Number of Trees Examined:			24	4	
Number of Trees Counted:			79	12	
Converting Factor Used:			2		
Number of Infested Trees (estimated from Facto	or):		158	- 24	
Average Board Foot Volume	per Tree	2,	421	_5,890	
Total Amount of Timber Kill 1916 and 1917:	lled,	374	518	141,360	
Condition of Infestation:					
Primary Insects: D.1	revicomi	s in YP an	d D.mc	nticolae	in SP
Status (1917): Incre	easing I	Decreasing	Balan	nced	
			— ye	S	
Further Data: (seriousness ity of timbe	of pres	sent infest	tation	, accessi	bil-
Present infestation of an	end e mi	o characte	r. Inf	ested tre	208
are widely scattered and d	o not oc	our in gro	ups. T	his unit	con-
tains the most accessible	timber w	ithin the	Stania	lans N.W.	The
Standard Lbr.Co. is opera	ting ext	ensively b	oth on	its own	and

Govt. holdings

Unit No. 46 Name: MT	· vurgue - com	OLGAY Infamiliary			
Period of Examination: July 28/Augu	st 7, inc., 1	917.			
Examiner: A. J. Jaenicke					
Approximate Acreage: 90,000					
Percentage of Ownership(Forest Se (National	rvice: 70%				
	Yellow Pine	Sugar Pine			
Approximate Stand of Timber (MBM)	630,000	794,000			
Number of Trees Examined:	36	1			
Number of Trees Counted:	105	8			
Converting Factor Used:					
Number of Infested Trees (estimated from Factor):	315	24			
Average Board Foot Volume per Tree:	2.421	5.890			
Total Amount of Timber Killed, 1916 and 1917: (bd.ft)	762,615	141,360			
Condition of Infestation:					
Primary Insects: D. brevicomis	in YP, and D.	monticolae in SP			
Status (1917): Increasing Dec	reasing Bala	nced			
	7	788			
Further Data: (seriousness of presentity of timber, etc.)	t infestation	, accessibil-			
Prosent infestation is endemic in r	nature. The i	insect-killed tree			
are not concentrated in groups. At	present most	of this timber i			
inecce sible, but the unit contains					
stand of timber owned by the government	ment in the St				
	7-1-0	77			

175.

Unit No. 47 Name: G	rohl (Stanisla	aus N.F.)			
Period of Examination: August 8 to Aug. 14. inc. 1917					
Examiner: A. J. Jaenicke					
Approximate Acreage: 61.000					
(Private: Percentage of Ownership(Forest Se (National	rvice: 70%				
	Yellow Pine	Sugar Pine			
Approximate Stand of Timber (MBM)	367.000	68,000			
Number of Trees Examined:	28	4			
Number of Trees Counted:	79	16			
Converting Factor Used:	2	.5			
Number of Infested Trees (estimated from Factor):	198	40			
Average Board Foot Volume per Tree:	2,481	5,890			
Total Amount of Timber Killed, 1916 and 1917: bd.ft.	479,358	235,600			
Condition of Infestation:					
Primary Insects:	in Y.P. and D	monticolae in SP			
Status (1917): <u>Increasing</u> <u>Dec</u>	reasing Balar	nced			
	уе	B			
Further Data: (seriousness of presentity of timber, etc.)	t infestation	, accessibil-			
A normal infestation with the inf	ested trees o	courring singly			
over the uncle eres. Consists of a	n inaccessible	e block of			
timber. In several places in this u	nit there are	evidences of			
considerable insect damage in yello	w pine in 191	2 and 1913.			

Unit N	· .	48	Name:	Sc	uth	Grove	(Stanislaus	N.F.
Period	of Exam	mination:	August 15	- Augus	t 1	9, 191	7	
Examin	er:	A. J. JAE	NICKS					
Approx	cimate A	creage: _	38,00	00				
Percentage of Ownership(Forest Service: 50% (National Park:								
				Ye:	Llow	Pine	Sugar Pine	1
Approx	rimate S	tand of Ti	mber (MB	(I)	289,	000	43,000	
Number	of Tre	es Examine	d:			21	2	
Number	of Tre	es Counted	l:			54	9	
Conver	ting Fa	ctor Used:	1			2		
		ested Tree ed from Fa				108	18	
Averag	ge Board	Foot Volu	ume per Tre	зе: <u> </u>	2,	421	5,890	
	Amount 1916 and	of Timber 1917:	Killed,	2	61,4	68	106,020	
		Infestatio			15			
· I	rimary	Insects:	.brevicom	is in Y	Par	d D.mo	nticolae in	SP
S	Status (1917): <u>I</u>	ncreasing	Decrea	sing	<u>Bala</u>	nced	
						<u> </u>	108	
Furthe	er Data:		ness of promber, etc		nfes	tation	, accessibil	
An	endemic	attack in	a relati	vely in	BCCE	ssible	bunch of	
timber	r. the b	est of wh	ich is pri	vately	own e	d. So	me evidences	
of a	heavier	infestatio	on than th	at whic	h ME	DEX NOW	exists.	

Unit No. 49	Name: Cal	laveras (Stani	slaus N.F.)
Period of Examination: Au	gust 20 -	August 26, inc	,1917/
Examiner: A. J. Jaenicke			
Approximate Acreage:	100		
Percentage of Ownership	(Private: (Forest Se (National	rvice:	
		Yellow Pine	Sugar Pine
Approximate Stand of Timbe	r (MBM)	277,000	50,000
Number of Trees Examined:		55	
Number of Trees Counted:		134	15
Converting Factor Used:			2
Number of Infested Trees (estimated from Facto	r):	268	30
Average Board Foot Volume	per Tree:	2,421	5,890
Total Amount of Timber Kil 1916 and 1917: Bd.ft Condition of Infestation:		-648,828-	-176 700
Primary Insects: n.b	revicomis.	in YP and D.	olae in SE
Status (1917): Incre	asing Dec	creasing Bala	nced
Further Data: (seriousness ity of timbe			, accessibil-
An endemic attack. The	he infeste	d yollow and a	sugar pines are
Widely scattered. The time	mber in th	is mit is of	rather high
quality but inaccessible.	The bett	er timber is	orivately owned

Unit No. 50 Name: Blu	ue Mountain (Stanisl	aus BF)
Period of Examination: August 27 to	August 31, inc., 19	17
Examiner: A. J. Jaenicke		
Approximate Acreage: 27,000		
Percentage of Ownership(Forest Se (National	65% rvice: 35% Park:	
	Yellow Pine Sugar	Pine
Approximate Stand of Timber (MBM)	186,000 49,	000
Number of Trees Examined;	29	2
Number of Trees Counted:	85	8
Converting Factor Used:	2.5	
Number of Infested Trees (estimated from Factor):	212	20
Average Board Foot Volume per Tree;	2.421 5.	890
Total Amount of Timber Killed, 1916 and 1917:	513.252 117.	800
Condition of Infestation:		
Primary Insects: D.brevicomis:	in YP and D.monticol	ae inSP
Status (1917): Increasing Dec	creasing Balanced	1
Further Data: (seriousness of presentity of timber, etc.)	nt infestation, acce	ssibil-
A normal infestation. The timber is	s inaccessible now a	and the
best of it is privately owned. In s	ome parts of the uni	t there
was considerable demage to yellow D	ine in 1912 and 1913	5. In 1914
there was an exceedingly rapid decl	ine in the infestati	on.
	THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.	

Unit No. 51 Name: Mol	celumne (Stani	slaus R.F.)
Period of Examination: Sept. 1 to	9, inc., 1917	
Examiner: A. J. Jaenicke		
Approximate Acreage: 61.000		
Percentage of Ownership(Forest Se (National	45% rvice: 55% Park;	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	191.000	107.000
Number of Trees Examined:	76	7
Number of Trees Counted:	186	26
Converting Factor Used:	2	
Number of Infested Trees (estimated from Factor):	372	
Average Board Foot Volume per Tree:	2,421	5,890
Total Amount of Timber Killed, 1916 and 1917: Bd.ft.	900,612	
Condition of Infestation:		Apple sale shake a sid
Primary Insects: D.brevicomis i	n YP and D.mon	nticolae in SP
Status (1917): <u>Increasing</u> <u>Decr</u>	ceasing Balan	ced
Further Data: (seriousness of present ity of timber, etc.)		
Although a balanced and normal infer	station. there	is more
insect damage now going on in this up	nit than in an	y other part
of the Stanislans. The best timber		Service of the Control of the Contro
all of it is inaccessible now.		
		A A A

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INTENSIVE PLOT DATA

North Stanislaus

Name of Plot: Area between North F	ork Tuolumne and	
Location: National ForestStani	sdaus.	Mokelumne
T R	, Sec. (Unit	s 45-51 inc.)
Description of Boundaries: Because	of the scattered	nature of
the infestation on this area, and be	ecause of the op	portunity
afforded to actually examine a cons	iderable number	of the
insect-killed trees, and further be-	cause of the exc	eedingly
low number of infested or killed tr	ees per unit are	a, no in-
tensive work was done on the 373,000	O acres covered	extensively.
Acreage: 373,000 acres.		
Period of Examination: July 20 -	September 10, 1	917.
Examiner: A. J. Jaenicke - assiste	d by W. C. Johns	on
	Yellow Pine x	M.B.M.
Approximate Stand of Timber (MBM):		4,567,000
Number of Trees Counted (Extensive work - spotted):		
Number of Trees Examined: Infested:	81	174
Abandoned: In 1917	73	165
Prior to 1917	115	313
Total:	269	652
Resulting Factor		
Average volume positive Average diameter A factor was arrived at for each up	per tree: 33.	5 inches
different considerations.	TTO GO G 1 COMTO	T POAGLAT

INTENSIVE PLOT DATA

North Stanislaus

Name of :	Plot: Area between North	Fork Tuolumne	
Location	: National Forest Stanis	laus	Fork Mokelum
	T, R.	. Sec. (U	nits 45-51, inc.)
Descript	ion of Boundaries: See Y.P.		
Includes	373,000 acres extensively	covered. No in	ntensive work
	examination of a considerabl		
trees of	the three classes enabled a	proportion (determination.
	siderations made possible a		
out of a	factor for each of the seve	n units.	A STATE OF THE STA
	373,000 on seven units.		
Period of	Examination: July 20 -	September 10	, 1917.
	A. J. Jaenicke - assiste		
		Sugar Pine	M.B.M.
Approxima	te Stand of Timber (MBM):		2,411,000
Number of (Extens:	Trees Counted ive work - spotted):		
Number of	Trees Examined: Infested:	10	64.
	Abandoned: In 1917	3	19
	Prior to 1917	8	41
	Total:	21	124
Resulting	Factor		
Average Average	volume per tree: 5.890 boa diameter per tree: 50.3 inc	rd ft.	

Name of P	lot: Extensive	- North Tu	olumne	ALC: N	
Location:	National Fores	t Stani	slaus		
	T	R.	Sec		
Cescripti	on of Boundaries	Lake El	eanor re	gion	
4					
		San Marin			
Acreage:					
Period of	Examination:	July 17 - 2	25. 1917.		
Examiner:	W. E. Glendenn	ing		M	
			Yellow	Dine	B.M.
Approximat	e Stand of Timbe	er (MBM):	1011100	1110	-grancy - grane
Number of (Extensi	Trees Counted ve work - spotte	;d):			
Number of	Trees Examined: Infest	ced:		3	3,610
	Abando In 19			4	
	Prior	to 1917		4	16,000
	Total:			7	19,610
Resulting	Factor				
	Average dia 3 Average B.M 2	5.6" ,801 bd.ft.			

INTENSIVE PLOT DATA

Name of Plot:	Extensive - No	rth Tuolu	mne	
Location: Nationa	el Forest St	anislaus		
T	, R.		Sec.	
Des,cription of Box	undaries: Lak	e Eleanor	distric	t
			Fre years	
Acreage;				
Period of Examinat	cion: July 17	to 25, 19	17.	
Examiner: W. E.	Glendenning			
	4.5	Sugar	Pine	В.М.
Approximate Stand	of Timber (MBM):		
Number of Trees Co (Extensive work				
Number of Trees Ex	Emined: Infested:		4	40,330
	Abandoned: In 1917			
	Prior to 19:	17	6	32,710
	Total:		10	73,040
Resulting Factor				

Average B.M. - 52.2"
Average B.M. - 7,304 ft.

Extensive - North Tuolumne

Diameter:	Number of Trees :	Volume (board feet)
12"	Yellow Pine	
14		
16		
16 18		140
20		140
22		
24		570
26		010
28		
30	Manual Services and Control of Co	
32		
34		
36		
38		2,900
40	-	6.700 F 700
	2	5.700
48	6	10,300
	And the second second second second	
(I) area are	TERRET TO A SECURIT FOR THE PARTY OF THE PAR	Brick Brook of Recording to The Brick Brick
	the bearing the second	
1 256		
a part		10 470
Total	7	19,610
	Swann Dine	
	Sugar Pine	
12"		
14	The second second second second	
16		
		170
18		130.
18		130
20 22	1	130
18 20 22 24		130
20 22 24 26		130
20 22 24 26 28		
20 22 24 26 28 30		130. 940
20 22 24 26 28 30 32		
20 22 24 26 28 30 32		940
20 22 24 26 28 30 32 34 36		
20 22 24 26 28 30 32 34 36 38		940 2,130
18 20 22 24 26 28 30 32 34 36 38 40		940 2,130
18 20 22 24 26 28 30 32 34 36 38 40 48	1	940 2.130 4.930
20 22 24 26 28 30 32 34 36 38 40 48 50	1 2	940 2.130 4.930 11.740
18 20 22 24 26 28 30 32 34 36 38 40 48 50 62	1 2 1	940 2.130 4.930 11.740 10.510
18 20 22 24 26 28 30 32 34 36 38 40 48 50 62 64	1 2 1 1	940 2.130 4.930 11.740 10,510 9.900
18 20 22 24 26 28 30 32 34 36 38 40 48 50 62 64 80	1 2 1	940 2.130 4,930 11,740 10,510 9,900 16,590
18 20 22 24 26 28 30 32 34 36 38 40 48 50 62 64	1 2 1 1	940 2.130 4.930 11.740 10,510 9.900

INTENSIVE PLOT DATA

Name of Plo		NAME OF TAXABLE PARTY.	CHEST SHEET SHEET	NAMES OF THE OWNER.			
Location:	National	Forest	Star	nislaus			
	Т.	, R.		, Sec			
Description	of Bound	laries: _	Region	north of	the	Merced	River
Bullock Pr	oject and	north					
					Mile		
Acreage:						- V	100
Period of E			A PROPERTY OF THE PERSON NAMED IN	ST, 1917.			
Examiner:	W. E. G	lendennin	g	With the Tie			
				Yellow 3	Pine		M.
Approximate	Stand of	Timber (MBM):		The contract of		
Number of T (Extensiv							
Number of T	rees Exam	nined: Infested:		6		7,08	50
		Abandoned In 1917				2,01	LQ
		Prior to	1917	23	3	52,77	10
	Ţ	otal:		30)	61,83	30
Resulting F	actor						A STATE OF
	ge dia ge B.M	32.2" 2,061 ft					

INTENSIVE PLOT DATA

Name of Pl	ot: Exte	nsive - Sou	ch Tu	olumne		70.7
Location:	National	Forest Sta	anisl	aus		
	T	, R		, Sec		
	n of Bound Project an	Page 1	gion	north of the	Merced	River
Acreage: _						
Period of	Examination	n: June !	5 to	21, 1917.		
Examiner:	W. E. Gle	ndenning				
				Sugar Pine	B.1	The second second second
Approximat	e Stand of	Timber (MB	M):			
Number of (Extensi	Trees Coun					
Number of	Trees Exam	nined: Infested:		11	92,51	.0
		Abandoned: In 1917		1	2,53	30
		Prior to 1	917	4	18,17	0
	1	otal:		16	113,8	10
Resulting						
	dia 54" B.M 7,0	75 ft.				

DIAMETER AND VOLUME OF TREES

Extensive - South Tuolumne

iamete					
	:Yell	ow Pine			
12"					
14	- 11	1	MERCETANA	50	
16					
18	Market and	2		280	
20	U. C.	E. Colores			
22		in the state of	Value of the spirit and		
24	The Later	2		1.010	
26		2	Maria Maria	1.930	
28	Control of	3	100	2.980 5.560	
30		4		5.560	
32		3		6,320	
34			4 120	0,000	a la
36		1		2,600	
38		4		11,800	STATISTICS.
40		5		15 600	
42	-	1		15.600 3.700	
		2		70,000	
44		6		10.000	
			- Name		
					7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
			-		
					A - 1 - 1 - 1 - 1
0.60					
968		30		61.830	
968 Total	:Suga	30 r Pine		61,830	
Total 12"	:Suga			61,830	
12" 14	:Suga			61,830	
12" 14 16	:Suga				
12" 14 16 18	:Suga			130	
12" 14 16 18 20	:Suga	r Pine			
12" 14 16 18 20 22	Suga	r Pine			
12" 14 16 18 20 22 24	Suga	r Pine			
12" 14 16 18 20 22 24 26		r Pine			
12" 14 16 18 20 22 24 26 28		r Pine		130	
12" 14 16 18 20 22 24 26 28 30		r Pine			
12" 14 16 18 20 22 24 26 28 30 32		r Pine		130	
12" 14 16 18 20 22 24 26 28 30 32 34		r Pine		130	
12" 14 16 18 20 22 24 26 28 30 32		r Pine		130	
12" 14 16 18 20 22 24 26 28 30 32 34 36		r Pine		130	
12" 14 16 18 20 22 24 26 28 30 32 34		r Pine 1		940 1,600	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		r Pine		940 1,600 5.660	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44		r Pine 1 1 2 1		940 1,600 5.660 3.250	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 48		r Pine 1 1 2 1		940 1,600 5.660 3,250 8,510	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 48 54		r Pine 1 2 1 2 1 2 1		940 1,600 5.660 3.250 8.510 6.530	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 48 54 60		r Pine 1 2 1 2 1 2 1		940 1,600 5.660 3.250 8.510 6.530 24.220	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 48 54 60 72		1 1 2 1 2 1 3 1 1 3 1		940 1,600 5.660 3,250 8,510 6,530 24,220 12,400	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 48 54 60 72 80		1 1 2 1 2 1 3 1 1 1		940 1,600 5.660 3,250 8,510 6,530 24,220 12,400 14,970	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 48 54 60 72		1 1 2 1 2 1 3 1 1 3 1		940 1,600 5.660 3,250 8,510 6,530 24,220 12,400	

200

Infested	trees	(July-September, 19	17). Units	45-51, inclus:	ive,
A POPULATION OF THE PARTY OF TH				Stanislaus	Natl. Forest

Tiá Omo h a m		Stanislaus
Diameter:	Number of Trees	: Volume (board feet)
12"	Yellow Pine	
14		: 800
	Enterprise Leave to the page of	: 100
16 :		
18 :	2	300
20 :	9	3,250
22 :	9 11 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	4 030
24 :		: 1.750 : 4.180
26 :	5	4.180
28 ;	4	3,840
30 :		
32 :		* Committee of the Comm
34 :	4	6.950
36 :	4	: 6.950 : 9.200
38 :	4	9.500
40 :	3	9.500
44 :	Explanation 1 property and the second	4.100
46 :	6	
48 :	2 %	0 000
50 :	3	5 300
54 :	3	5,200
56	1	7,300
60		31,600 : 36,800
60 : Total :	4	: 36,800
Total	81,	174 200
		174.200
		, 114,000
	Sugar Pine	
No. 1		:
12"		:
12"		TITE.BUU
12" 14 16		
12" 14 16 18		
12" 14 16 18		
12" 14 16 18 20		
12" 14 16 18 20		
12" 14 16 18 20 22 24		
12" 14 16 18 20 22 24 26		
12" 14 16 18 20 22 24 26 28		
12" 14 16 18 20 22 24 26 28 30		
12" 14 16 18 20 22 24 26 28 30 32		
12" 14 16 18 20 22 24 26 28 30 32 34		
12" 14 16 18 20 22 24 26 28 30 32 34 36	Sugar Pine	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	Sugar Pine	2.450
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42	Sugar Pine	2.450
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 46	Sugar Pine	2.450
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 46 48	Sugar Pine	2.450 3.540 9.270 4.930
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 46 48 54	Sugar Pine 1 2 1	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 46 48 54	l l l l l l l l l l l l l l l l l l l	2.450 3,540 9.270 4,930 6.530
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 46 48 54	Sugar Pine 1 2 1	2.450 3.540 9.270 4.930 6.530 17.440
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 46 48 54 60 64 :	l l 2 l 2 2 2	2.450 3,540 9.270 4,930 6.530 17.440 19.890
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 46 48 54	l l l l l l l l l l l l l l l l l l l	2.450 3.540 9.270 4.930 6.530 17.440

DIAMETER AND VOLUME OF TREES

Trees abandoned, 1917. (Units 45-51, inc.) Stanislaus N.F.

	: Number of Trees	Volume (board feet)	A.J.Jaenick
	Yellow Pine		
12"	6	400	
14	: 3	250	
16	6	860	
18	: 2	460	
20	10	3,510	
22	6	3,510 3,140	
24	: 1 2	150	
26	: 2	1,400	
28	; 4 ;	4,400	
30	2	3,000	
32 34		1.520	
36		1,760	
20 40°	4	8.000	
1 42		5.800 3.700	- Carlo Developed
44		19,300	
46		4 200	
48		4,200 14,100	
50		10.400	
54		5,700	
56	Laboration Laboration	7,500	
62		9.800	
Stotest 66	8 Total: 73 :	55,300 Total: 164	640
	The state of the s		
20 22 24 26 28 30 32 34 36			
14 16 18 20 22 24 26 28 30 32 34 36 38 40			
14 16 18 20 22 24 26 28 30 32 34 36 38		5,320 14,080	

Trees abandoned Prior to 1917 (Units 45-51, inc.) Stanislaus N.F.

iameter:	Number of Trees	: Volume (boa	rd feet)	A.J.Jaenicke
	Yellow Pine		Franchis	
12"	12	1.030		
14		550		
16	1	: 190		
18				
20	5	1,620	METALER VALUE	
22	10	3,510		
24	6	3,510 2,770		
26 :	7	: 4.930		
28	3	: 3.200		
30 :		5,560		
32		: 1.520		
34	6	: 11.000		YP
	8	: 16,000	(C	ontinued)
38				No. trees Vol.
40	5	: 13,600		
	8 5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	: 28.600	58	_ 0 0
46	4	; 15.700	60	2 18,400 3 25,630
50	8	: 41,100	66	
52		5,200	68	2 24.000
54	Particular Variables	: 45,300		
56	6	: 43,400	Totals:	115 312,810
m 1.5		Andrew Control		
Total				
	: :Sugar Pine			
	· Dugal line			
12"				
14	Bishes of State of State	BUREAU STOLEN		014 72 12 12 12 12
16		CHANCE OF CHANCE OF		
18	· COLDENS CHARLES COLD			
20		ALTON AND A PARTY		
22	A SHEET SHEET AND A SHEET			
24		ATALES BY THE RESERVE		The second second
26		PEOPLE REPORT AND		SAN SANSANTINE
28		2		
30		1.250		
32				
34				
36				
38				
40	: 3	: 10.110		
44		: 10.110	Fire Land	CHEST STATE OF STATE OF
56	1	: 7.110		
58		: 8.140	Teller although and	
66	: 1	: 10,000		
15-3-1	•	•		
WE FIRE	:	4		1
Maha"	8	40,590		
Total			THE PERSON NAMED IN	
				The second secon

Average Diameters and Volumes of Trees Killed By Insects on Units 45-51, inclusive, On the Stanislaus National Forest. (Insect Survey of July - September, 1917.)

235

YELLOW PINE	ı			rage Diameter (inches)	Volume (Board ft)
	Infested Abandoned i Abandoned p All three c	rior to	1917*	30.2 35.3 34.0 33.5	2,151 2,255 2,713 2,421
SUGAR PINE					
	Infested Abandoned i Abandoned p All three c	rior to	1917*	52.2 53.3 46.8 50.3	6,405 6,466 5,074 5,890

Classification of Trees Actually Examined. On Units 45-51, inclusive. (These trees were used to determine average volumes and diameters.)

		No. of trees
YELLOW P	INE:	
	Infested Abandoned in 1917 Abandoned prior to 191 All three classes	81 73 115 269
SUGAR PI	<u>NE</u> :	
	Infested Abandoned in 1917 Abandoned prior to 191 All three classes	7* 10 8 21

^{*} Consists only of trees killed in 1916.

a Freniske

STERRA MATTORAL FOREST

Infostation Units

Including The

Private Timber Lands.

(Units 20 - 36, inclusive)

S Insect Control Survey Sierra

REPORT

on the

INSECT SURVEY

of the

SIERRA NATIONAL FOREST

During the

Summer of 1917.

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The Field Examination

On this forest the data on the insect losses during the years 1916 and 1917 were secured from actual insect control projects, as well as by the method of extensive reconnaissance which was followed uniformly for portions of three other National Forests and three National Parks. The bulk of the data was collected by Mr. Ralph Hopping of the Forest Service, and Messrs. J. M. Miller and J. E. Patterson of the Bureau of Entomology, during the four month period from June to September, 1917. Additional data were submitted by Messrs. C. A. Jordan, A. K. Wofford, Roy Boothe, and by the White and Friant Lumber Company.

ered in the survey, and the three largest holders of private stumpage within the Sierra paid the field expenses incident to the examination of their lands. These companies included the Madera Sugar Pine Company, the Fresno Flume Company, and the White and Friant Company. It is particularly to the White and Friant Company that special credit is due, not only for its assistance on the Sierra survey, but because of the active part which the company played in securing the cooperation of the other large private holders of yellow pine and sugar pine in that portion of California south of the American River.

As a result of this survey, it was possible:

^{1.} To divide the Forest (both Government and private lands) into so-called infestation units.

- 2. To estimate the insect losses which occurred on these units during 1916 and 1917.
- 3. To classify these losses according to their severity, and the urgency of control work to reduce them, taking into consideration
 - A. Timber values.
 - B. Probability of increase or decline of the present losses.

The data will by no means obviate the necessity of careful cruising just prior to the inauguration of an individual control project. The 1917 insect survey data is too rough on which to base cost estimates on any specific project. And then, fluctuations in the severity of a given infestation may easily occur even within a year or two after the 1917 survey. The 1917 reconnaissance has its chief value in that the Forest has been definitely divided into infestation units which will logically form the control projects of the future. With these units or danger zones already outlined, it will be possible to establish a definite insect control policy for the Sierra as soon as the funds become available for the work. For the present at least no yellow pine or sugar pine areas outside of the units as they are marked on the insect survey map need be considered.

More detailed information on the stands of timber and the insect losses on the individual units can be obtained from the general report of the survey, and the so-called "Summary of the Data on the Infestation Units". Copies of these reports are on file in the District office.

In arriving at conclusions in regard to the signifi-

cance of the insect losses on the individual units, it was quite desirable to estimate the stand of sugar pine and yellow pine on the various units. The absence of definite reconnaissance figures made some of these estimates little more than guesses. The revision, therefore, of the stand figures submitted, as more information becomes available, should be given attention by the Supervisor's office.

Topographic Features of the Units

The commercial belt of timber included in the units on the Sierra is much wider east and west than that of the Sequoia. This is due to the fact that the pine belt extends to lower elevations on the Sierra than on the Sequoia and to the general topography of the foothills. The western front is bounded by the low non-forested foothills. The units are separated from each other by deep river canyons in a few instances, but usually by high ridges. The lower elevations of these ridges do not present a change of type, however, but form a continuous pine belt toward the front bordering the San Joaquin Valley. It has, therefore, been considered necessary, under the present method of insect control, to work a group of units in order to cover a large enough territory to prevent infestation from outside areas.

Infestation in all species of pine occurs in more or less epidemic form on all the units. It is particularly heavy in the sugar pine (Pinus lambertiana) caused by the bark beetle (Dendroctonus monticolae). The loss in the next few years in this region will probably be very heavy. Yellow pine (Pinus ponderosa) is killed by the common bark beetle (Dendroctonus brevicomis) and occasionally by a flathead borer (Melanophila gentilis). Considerable loss in pole and sapling stands has been caused from time to time by the engraver Ips confusus, but epidemics of this species are sporadic and short lived, seldom lasting more than two years. The Jeffrey pine (Pinus Jeffreyi) is killed by the usual Dendroctonus Jeffreyi.

Infestations are epidemic in units 20, 21, 22, 23, 24, 25, 26, 27, 28, and 29, while on units 30 to 38 the infestation is much less, although apt to become epidemic at any time. The loss is, therefore, much greater in the southern Sierra National Forest than in the northern part. Unit 20-A is not epidemic at present and unit 22-A has still very little infestation due to the thorough control work of 1914 and 1915. Units 21, 25, 26 and 29 were covered by control work this year. The infestation will, therefore, be much less on these units in 1918. The White & Friant Lumber Company is again working the infested trees this fall (1917) on unit 29. In

order to complete a large comprehensive area, units 24 and 27 should be worked in the spring of 1918.

Survey Area and its Division into Units.

The area covered by the survey on this forest included the main commercial stand of sugar and yellow (including Jeffrey) pine, extending from the Merced River to the Kings River, including a portion of the Yosemite National Dark south of the Merced River.

This commercial area was divided into 21 infestation units, the location of which are shown on the map accompanying this report. Each unit is a complete insect control project in itself, and in future control work on this Forest, the control projects will be named and numbered in accordance with the designation given them in this survey.

In the following tabulation, the total acreages of these units are given. The area in each unit which is under the administration of the Forest Service, the Yosemite National Park, and in the hands of private owners, has been worked out, but since the proportion of actual timber to be protected is the true basis for cooperative work rather than acreage percentages, the ownership by area is omitted here. They will be found in the report entitled "Summary of Data on Infestation Units".

No.	Name of Unit	Acreage
20	Dinkey	25,300
20-A	Patterson	12,200
21	Blue Canyon	12,600
22	Stevenson Creek	2,240
22-A	Jose Basin	10,400
23	Big Creek	12,000
24	Hogue Ranch	18,800
25	Rock Creek	5,920
26	Chiquito	13,600
27	Jackass	5,120
28	Dalton	23,700
29	Sand and Whiskey Creek	24,500
30	Willow Creek	23,000
31	Fresno River	34,000
32	Mt. Raymond	14,000
33	Wawona	18,000
34	Iron Mountain	3,600
35	Chowchilla	13,000
36	Signal Peak	11,500
37	Mariposa	8,500
38	Alder Creek	24,000
	Total covered in the survey:	315,980

The 316,000 acres of yellow pine-sugar pine timber 215 included in the previous table, are divided by ownership as follows:

	Acres	Per Cent
Sierra N. F.	211,000	67
Yosemite N. F.	24,000	8
Private	81,000	25
Total	316,000	100

As will be seen in a later section of this report, the average stand on the private holdings is so much greater than on the National Forest, that the above acreage percentages cannot fairly be used in working out cooperative bases for control operations.

Timber Stands on the Survey Area

In order to guage the protective values involved in the various units, it was necessary to estimate the stands of yellow pine (includes Jeffrey pine) and sugar pine on all of these units, even in the face of the absence of adequate reconnaissance data. The figures about to be given are therefore subject to much revision from time to time.

It is estimated that included in the 21 infestation units, totalling 316,000 acres, there are:

 Yellow Pine
 3,183,000

 Sugar Pine
 2,240,500

 Total
 5,423,500

By ownership this timber is divided as follows:

Timber Within Infestation Units

Ownership	Stand in M. ft.
	'Yellow Pine'Sugar Pine' Total
Sierra W.F.	, 2.263,000 , 860,000 , 3,123,000
Yosemite N.P.	' 161.500 ' 100.000 ' 261.500
Alienated	758.500 1 1.280.500 2.039.000
Total	, 3.183.000 , 2.240.500 ; 5.423.500

A scrutiny of the infestation unit map accompanying this report plainly shows that the 21 infestation units do not cover all of the sugar pine and yellow pine timber within the Sierra National Forest. In order that it may be plain just what proportion of all of the sugar pine and yellow pine is included in the 21 units, the following table is given. It will be seen that practically all of the alienated timber, over 99% of it, is within the infestation units.

Timber Within Sierra National Forest

Ownership	· Stand	in M. ft	•	
	'Yellow Pine'Sug	ar Pine'	Total	
Sierra N. F.	2.892.500 11.	115.500	4.008,000	
Alienated			2.049.000	
Total	3,659,000 . 2.	398.000.	6.057.000	

Inasmuch as one of the important considerations in deciding for or against the inauguration of a control project is that of the stand of timber to be protected by control operations, the following data on timber stands is submitted in detail in spite of the unreliability of some of the estimates.

2

Stands of Timber in Sierra Infestation Units

in M. ft. B.M.

Unit Unit Name	1		Yellow Pi	in	Stand					Sugar P	ine	Stand		
No.	T	Forest '	Alienated	1	Park*	1	Total '	Fores	t."	lienate	d 1	Park* I	Total	
20 'Dinkey	1	129,500'	126,000	2		1	255,500	118,50	01	252,000	7		370,500	
20 A'Patterson		226,000'	500	T			226,500'	145,000	0'	500	Ŧ	1	145,500	
21 'Blue Canon		224.000	6,500	1		1	230,500'	2,50	01	9,500	T	1	12,000	
22 'Stevenson Cr.4	T	21,500'	1,500	1		1	23.000	5.00	01	1,500	7		6,500	
22 A'Jose Basin	-1	71,500'	20,000	T		1	91,500'	11,00	0'	6,000	1		17,000	E-W
23 'Big Creek	1	112,000'	10,000	-7		1	122.000'	29.00	0'	15.000	1		44.000	
24 / 'Hogue Ranch	1	250,000	4,000	7		Ŧ	254,000'	73.00	01	6,000	Y		79,000	
25 v 'Rock Creek		54,500'	6,000	1		7	60,5001	42,50	0 1	6,000	T		48,500	Mc K
26 Chiquito	1	177,0001	26,500	7			203,5001	31,000	0 1	16,500	1	1	47,500	
27 v' Jackass	1	66,0001	3,000		1		69,000'	6,500	0'	1,500	T		8,000	
28 L'Dalton	-1	241,500'	The state why state with the	1			241,500'	63,000) t		T		63,000	1
29 'Sand&Whiskey Cr	. 1	83,500'	183,000	Y			266,500'	98,50	0'	305.000/	8		403,500	1
30 'Willow Creek	1	164,000	29,500	1			193,500'	25,500	01	7,500	1		33,000	
31 'Fresno River	10	112,500'	71,500	1	1		184,000'	15,000) !	35,500	1	1	50,500	4
32 'Mt. Raymond	1	7.000'	70,000	1	28,000'	Į.	105,000'	56.000) 1	210,000	7	70,000'	336,000	
33 'Wawona	¥	36,5001	54.000	7	49,500'		140,000'	14,500) '	324.000	*	18,000	356,500	
34 'Iron Mountain	1	49,000	500	1	The state of the s		49,500'	77,000) 1	4,500	T		81,500	
35 'Chowchilla	1	83,000'	22,500	1	Y	7	105,500'	13,000) !	5,000	1	1	18,000	
36 'Signal Peak	2	54,500'	89,500	1	1]	144,000'	21,500) 1	67,000	1	1	88,500	6 3.17
37 'Mariposa	1	52,0001	30,500	-	1		82,5001	7,000		7,000	-	-1	14,000	The same
38 'Alder Creek	1	47,000'	3,500	1	84,0001]	134,500'	5,000) 1	500		12,000'	17,500	
Totals	2.	262,500	758,500	1	61,500	3]	182,500	860,000	1,	280,500	10	00,000 2	2,240,500	

^{*}Yosemite National Park.

The losses in the yellow pine and sugar pine of this

Forest can be classified according to whether the timber is accessible or not, and with reference to the degree of infestation.

It is believed that all of the sugar pine and yellow pine included in the units can be classed as commercial, but not all of it is accessible. Because of the high scenic value of the timber within the Yosemite National Park, all the timber within it (only that portion south of the Merced River is included in this report) is considered to be equal in importance with the timber in the commercial and accessible class, and is, therefore, put in that classification. The 21 units discussed in this report have been divided into these three classes:

- 1. Epidemic attacks in commercial and accessible timber.
- 2. Epidemic attacks in commercial but not accessible timber.
- 3. Normal attacks of much lesser severity in commercial timber, including both accessible and inaccessible stands.

It is evident that the units in class 1 deserve earlier attention than either class 2 or class 3.

The epidemic infestations in commercial and accessible timber include the following 16 units (class 1 units):

Dinkey	20
Blue Canon	21
Stevenson Creek	22
Big Creek	23

Hogue Ranch		24
Rock Creek		25
Chiquito		26
Sand & Whiskey	Creek	29
Fresno River		31
Mt. Raymond		32
Wawona		33
Iron Mountain		34
Chowchilla		35
Signal Peak		36
Mariposa		37
Alder Creek		38

In the above class 1 units there are 222,100 acres, or 2,359,000 M. feet of yellow pine and 1,976,000 M. feet of sugar pine. Roughly, about 55% of this timber is under Forest Service administration, 40% in private ownership, and 5% in the Yosemite National Park, and it represents almost 80% of the sugar pine-yellow pine stand under discussion in this report.

In these 16 class 1 units is occurring almost 90% of the insect losses of the 21 units considered in this report. Specifically, 8,478 M. out of the 9.508 M. of 1917 loss on all 19 units was confined to timber which is both commercial and accessible.

The following is a tabulation of the 1917 insect losses in these 16 class 1 units.

Insect Losses on Class One Units on Sierra for 1917
In Board Feet

No. t	Name of Unit		Yellow P	ine'S	lugar Pir	10 1	Total
10 0s	nkev	1	249.000	ין	598,000	17	847,000
21 Bl	ne Canvon	1	425.000	1	29.000	1	454.000
22 ' St	evenson Creek	T	228,000	1	23,000	1	251,000
23 ' Bi	g Creek	1	257,000	1	40,000	1	297.000
24 ' Ho	gue Ranch	1	221,000	1		1	221,000
25 ' Ro	ck Creek	. 1	137.000	1	74,000	1	211,000
26 ' Ch	iquito Basin	1	667,000	1	66,000	1	733,000
29 1 Sa	nd and Whiskey Creek	1	469.000	12	164,000	12	633.000
31 ' Fr	esno River	1	222.000	f	130,000	T	352,000
32 ' Mt	Raymond	1	76,000		171.000	1	247.000
33 War	Mona	1	106.000	7	163.000	1	269.000
34 ' Ir	on Mountain	1	28.000	T.	131.000	1	159.000
35 ' Che	owchilla	1	75,000	1	56,000	1	131,000
6 ' St	gnal Creek	T	42,000		364,000	1	406.000
7 ' Ma	riposa	1	125.000	1	20.000	1	145.000
8 ' Al	der Creek	3.	53,000	5,	70.000	8,	123,000

Class 2, epidemic infestations which are in commercial timber which is not accessible, contains only two units. These are as follows, together with the 1917 insect losses in them:

Jackass 27.	bd. ft.
Yellow pine loss,	68,000
Sugar pine loss, Total	5,000
Dalton 28.	bd. ft.
Yellow pine loss,	462,000
Sugar pine loss,	283,000
Total	745,000

The annual loss from insects during 1917 on the class

2 infestations on the Sierra was, therefore, 818,000 board feet. Inasmuch as this loss is in inaccessible timber, control measures are not as urgent as they are in the class 1 areas.

Class 3 includes the normal or endemic infestations.

Only three units of the 21 shown in the Sierra insect survey

map are in this class. These units, with the 1917 insect

losses occurring on them, are:

Patterson Mountain 20A.	bd. ft.
Yellow pine loss, Sugar pine loss, Total	43,000 56,000 99,000
Jose Basin 22A.	
Yellow pine loss Sugar pine loss,	bd. ft. 30,000
Total	30,000
Willow Creek 30.	
Yellow pine loss Sugar pine loss, Total	bd. ft. 74,000 8,000 82,000

The 1917 insect loss in yellow pine and sugar pine in the class 3 units amounts to 211,000 board feet. This loss is brought about by what is known as an endemic or normal infestation. In actual practice it is exceedingly difficult to draw the line between epidemic and normal attacks. In the areas covered by the 1917 insect survey the difference seems to lie in the degree or severity of the attack rather than in the character. The trees killed in a so-called normal attack are

quite frequently just as large and give as much evidence of previous thriftiness as those in the epidemics. As a consequence, it may eventually be considered good business to give attention to many of our normal infestations. At present, there are far too many real epidemics which require attention and money to warrant immediate and serious consideration of class 3 attacks.

The acreage covered by all three classes of infestation, that is, those 21 infestation units under consideration in this report, are as follows:

Class 1, 222,000
Class 2, 29,000
Class 3, 65,000
Total 316,000

The average infestation unit on this Forest has, therefore, an acreage of 15,000 acres.

during 1917 was as follows:

bd. ft. Per Cent
Class 1 8,479,000 9
Class 2 211,000 2
Total 9,508,000

In connection with the above tabulation it is of importance to see how the loss of 9,508,000 board feet is divided according to ownership.

bd. ft.

 National Forest loss
 5,665,000

 National Park loss
 416,000

 Private loss
 3,427,000

 Total
 9,508,000

As has already been stated, 5,423,500 M. of yellow pine and sugar pine are included in the 21 infestation units on the Sierra. This timber can be divided into three classes according to the character of the infestation it is suffering from and the accessibility of the timber. For the sake of clearness, the characteristics of each of these classes is given again:

- Class 1. Epidemic infestation in commercial and accessible timber.
- Class 2. Epidemic infestation in commercial but inaccessible timber.
- Class 3. Normal attacks in commercial timber, both accessible and inaccessible.

Classification of Timber According to

Accessibility and Character of Infestation

In M. Board Feet

Class	1	Yellow Pine	1	Sugar Pine	ť	Total
1	1	2,359,000	1	1,976,000	1	4,335,000
2	1	310,500	7	71,000	1	381,500
3	Ŧ	511,500	7	195,500	1	707,000
Total	T	3,181,000		2,242,500	1	5,423,500

A comparison between the 1917 insect losses and the stands of timber in which they are distributed reveals the fact that these annual losses are considerably less than one per cent of the stand. In this connection it should be remembered that these losses frequently continue year after year until a

considerable proportion of the timber has been killed. And then too, the best trees in the stands are those included in the losses. That these losses are in good sized timber is indicated by the following table:

Average Volume of Individual Insect-killed Trees In 1917.

(Actual Board Feet)

No. of Name of Unit		Yellow Pi	ie 'S	ugar Pine
20 'Dinkey	1	2,500	1	6,000
20 A 'Patterson Mountain		1,300		2,500
21 'Blue Canyon		1,382	7	4,666
22 'Stevenson Creek		1,374	S. Train	2,648
22 A 'Jose Basin		1,374	1	
23 Big Creek	1	1,374	1	2,648
24 'Hogue Ranch	1	1,400	1	
25 'Rock Creek		1,165	1	3,130
26 'Chiquito Basin	1.0	1,080	1	1,081
27 'Jackass	To the	1,114	1	2,000
28 'Dalton	1	1,161	1	4,050
29 'Sand and Whiskey Creek	1	1.100	1	4.810
30 'Willow Creek	1	1,000	1	3,000
31 'Fresno River		2,500	¥	6,500
32 'Mt. Raymond	1	2,500	1	6,500
33 Wawona	1	2,500	1	6,500
34 'Iron Mountain	1	2,000	1	5,000
35 'Chowchilla	7 4 The	2,000	1	5,000
36 'Signal Peak	1	2,000	1	6,000
37 'Mariposa	1	2,000		4,000
38 'Alder Creek	1	1,500	1	4,000

Control of Insect Losses

In the previous sections of this report it has been brought out that the infestations in class 1, namely epidemic attacks in timber that is both commercial and accessible, deserve first attention. After that, those epidemic depredations which exist in timber which is commercial but not now accessible, or class 2 units, should probably be taken care of. And then, finally, the normal attacks in commercial timber should be considered in the formulation of an insect control policy.

By far the greater proportion of the yellow pine and sugar pine timber in the Sierra National Forest is at present involved in epidemic insect losses. The epidemics in timber which is both commercial and accessible cover 222,000 acres and include 16 units. The ideal procedure would take care of all of these class I units in a single year, but past experience in insect control work indicates that the application of efficient control measures over such a large area during a month or six weeks, is tied up with administrative difficulties. Neither has past experience shown that the best results are secured by taking care of a few units each year. In the working out of an insect control policy on a Forest such as this, where township after township is suffering from epidemic losses, the proper grouping of the various units with the idea of covering them all in a few consecutive years is both an important and perplexing matter.

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With the constant fluctuations in the infestation on individual units, with the uncertain changes in the cost of labor and subsistence, and because of the impracticability of arbitrarily fixing in advance what percentage of the infestation it is necessary to remove, or deciding in advance what infestations require more than one year's work, it is impossible to accurately foretell the cost of control measures. In order that a rough approximation of the cost of such work may be arrived at, assume

- 1. A cost of \$4.00 per M. for treating the timber in the epidemic attacks, and \$8.00 per M. in the normal infestations.
- 2. The removal of 80% of the 1917 spring and fall attacks.
- 3. The necessity of only one year's work.

With the above conditions, the cost estimates will not exactly coincide with those computed in the general report of the survey.

Cost of Control by Classes

Of Infestation and by Ownership
(Sugar Pine and Yellow Pine Within Infestation Units Only)

Class	National Forest	Park	Private	Total
1	\$15.700	\$1.400	\$10.500	\$27,600
2	1,600	0	0	1.600
3	400	0	0	400
Total	: \$17.700	\$1,400	: \$10,500 :	\$29.600

The above table shows plainly that:

- 1. Almost 90% of the total cost of control is required for Class 1 infestations.
- 2. Over one-half of the cost falls properly on the Forest Service.

In addition to the depredation within the infestation units, there is also some outside the unit boundaries, but this is not sufficient in quantity, or of a character to warrant serious consideration here.

Manicke

Insect Control Survey

SUMMARY OF INSECT SURVEY

ON THE SIERRA NATIONSL FOREST.

J. M. Miller

SURVEY AREA.

The area covered by the survey on this forest embraced the main commercial area of sugar and yellow (including Jeffrey) pine extending from the Kings River on the south to the Merced River on the north, including a portion of the Yosemite National Park south of the Merced River.

tion udits, the location of which are shown on the map accompanying this report. The numbers, names and acreage of each unit are given in the following table. In future insect control work these units will correspond to control units, the names being used for the designation of the various projects.

No.	Name	Acreage
20	Dinkey ?	25,300
20-4	(12,200
21	Blue Canyon - ?	12,600
22	Stevenson Creek	2,240
22-A	Jose Basin -	10,400
23	Big Creek L	12,000
24	Hogue Ranch -	18,800
25	Rock Creek -	5,920
26	Chiquito ~	13,600
27	Jackass -	5,120
28	Dalton ~	23,700
29	Sand and Whiskey Creek	24,500
30	Willow Creek	23,000
31	Fresno River	34,000
32	Mt. Raymond	14,000
33	Wawona	18,000
34	Iron Mountain	3,600
35	Chowchilla	-13,000
36	Signal Peak	11,500
37	Mariposa	8,500
38	Alder Creek	24.000
	Total covered in the survey:	315,980

PINE AREAS OUTSIDE OF THE UNITS.

There are large and extensive pine areas outside of the units, the most extensive of which is Jeffrey pine.

Many of these areas are liable to epidemics but can hardly be considered accessible at the present time as they are situated in valleys between the accessible commercial timber and the sub-alpine coniferous belt on the main divide of the Sierras. The loss in this timber, however, has been estimated on a minimum basis.

OWNERSHIP.

The only large mill operating in the Sierra National Forest is the Madera Sugar Pine Co. The Freeno Flume and Lumber Co. has not been in operation since the fall of 1914.

The only other important holding is that of the White & Friant Lumber Co. Aside from these three companies the other holdings are small and scattered.

All three companies cooperated in the survey. The

percentage of ownership surveyed is approximately as follows:

Forest Service - 67%

National Park - 8%

Private - 25%

INSECT SURVEY.

The Madera Sugar Pine Co., the Fresno Flume & Lumber Co., and the White & Friant Lumber Co. all cooperated in the survey; the first and second financially and the third to the extent of actual control work, the resulting data on which had been used to show the actual loss. The examination of the various units was made by J. E. Patterson. J. M. Miller and Ralph Hopping during portions of June, July and August. The units "Sand and Whiskey Creek, Rock Creek, Chiquito and Blue Canyon' were not surveyed as control work was actually in operation. Therefore, the actual data obtained from the work was used.

TOPOGRAPHIC FEATURES OF THE UNITS.

The commercial belt of timber included in the units

on the Sierra is much wider east and west than that of the Sequoia. This is caused by the pine belt extending to lower elevations than that of the Sequoia and the general topography of the foothills. The western front is bounded by the low non-forested foothills but the general altitudinal slope is much longer due to the absence of the Great Western Divide which terminates in the southern Sierra National Porest. The units were divided by deep river canyons in some instances but mostly by ridges between watersheds. The lower elevations of these ridges do not present a change of type, however, but form a continuous pine belt toward the front bordering the San Joaquin Valley. It has therefore. been considered necessary under the present method of insect control to work a group of units in order to cover a large enough territory to prevent infestation from outside areas. RELATION OF TIMBER STANDS.

The volume of sugar to yellow and Jeffrey pine bears the relation of about 2 to 3. Fir and cedar in

mixture form considerable part of the stand in some units and from the San Jeaquin River northward Douglas fir occurs.

OCCURRENCE OF INFESTATION.

Infestation in all species of pine occurs in more or less epidemic form on all the units. It is particularly heavy in the sugar pine (Pinus lam ertiana) caused by the bark beetle (Dendroctonus monticolae). About forty acres of girdled sugar pine on the holdings of the Fresno Flume & Lumber Company's lands (girdled in the fall of 1914) has every girdled tree so heavily infested that there exists a decided menace to surrounding timber. The loss in the next few years in this region will probably be very heavy. Yellow pine (Pinus ponderosa) is killed by the common bark beetle (Dendroctonus brevicomis) and occasionally by a flathead borer (Melanophila gentilis). Considerable loss in pole and sapling stands has been caused from time to time by the engraver Ips confusus, but epidemics of this species are

sporadic and short lived, seldom lasting more than two years. The Jeffrey pine (Pinus Jeffreyi) is killed by the usual Dendroctonus Jeffreyi.

Infestations were epidemic in units 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29, while on the balance of the units 30 to 38 the infestation was much less though liable to become epidemic at any time. The loss is, therefore. much greater in the southern Sierra National Forest than in the northern part. Unit 20-A is not epidemic at present and unit 22-A has still very little infestation due to the thorough control work of 1914 and 1915. Units 21, 25, 26 and 29 were covered by control work this year. The infestation will, therefore, be much less on these units in 1918. The White & Friant Lumber Co. are again working the infested trees this fall on unit 29. In order to complete a large comprehensive area, units 24 and 27 should be controlled in the spring of 1918.

CONTROL MEASURES.

advantage to any unit not yet worked but particularly so to units south of Crane Lake or the watersheds of the San Joaquin and Kings Rivers. Of primary importance, however, are units 20, 24 and 27.

SUM MARY.

A summary of the timber stands and total annual loss for 1917 in sugar and yellow pine with the loss on each unit is attached.

SIERRA NATIONAL FOREST

TABLE 1. Timber Stand in M. ft. B.M.

	Yellow Pine	Sugar Pine	Total
Forest Service Alienated	2,892,500 766,500	1,115,500 1,282,500	4,008,000
Totals:	3,659,500	2,398,000	6,057,500
National Park*	161,500	100,000	261,500
Totals:	3,821,000	2,498,000	6.319.000

TABLE 2.
Timber Stand included in the Survey, in M. ft. B.M.

	Yellow Pine	Sugar Pine	Total
Forest Service Alienated	2,263,000 758,500	860,000 1,280,500	3,123,000 2,039,000
Totals:	3,021,500	2,140,500	5,162,000
National Park*	161,500	100,000	261,500
Totals:	3,183,000	2,240,500	5,423,500

TABLE 3.
Estimated Insect Losses, 1917, in M. ft.B.M. & Values

	Volume	Rate per M.	Value
Yellow Pine Sugar Pine	4,568 5,827	\$2.00 2.75	\$ 9,136.00 16.024.00
Total loss:	10,395		\$25,160.00

^{*} Refers to the Yosemite National Park and only that portion included in the infestation units.

SIERRA NATIONAL FOREST*

PINE LOSS. 1917

	PINE LOSS, 1917 : Ft.BM.			
No.	Name .	: Yellow Pine	: Sugar Pine	: Total
20	Dinkey	249,375	1,597,500	1,846,875
A08	Patterson Mountain	43,075	56,250	99,325
21	Blue Canyon	425,425	29,162	454,587
22	Stevenson Creek	228,375	23,175	251,550
22A	Jose Basin	29,938	0	29,938
23	Big Creek	257,074	39,720	296,794
24	Hogue Ranch	221,445	0	221,445
25	Rock Creek	136,850	74,337	211,187
26	Chiquito Basin	666,527	65,737	732,264
27	Jackass	68,260	5,000	73,260
28	Daulton	461,672	283,500	745,172
29	Sand & Whiskey Creek	468,875	2,164,500	2,633,375
30	Willow Creek	74,300	7,500	81,800
31	Fresno River	222,000	130,000	352,000
32	Mt. Raymond	76,310	170,625	246,935
33	Wawona	106,375	162,500	268,875
34	Iron Mountain	27,500	131,250	158,750
35	Chowchilla	74,925	56,250	131,175
36	Signal Peak	41,625	363,750	405,375
37	Mariposa	124,875	20,000	144,875
38	Alder Creek	52,725	70,000	122,725
	Totals in Ft. B.M.	: 4,057,526	5,518,256	9,508,282

^{*} Includes both Government and private timber.

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Unit No. 20 Name	e: Dinkey
Period of Examination: August	20, 21 & 22, 1917.
Examiner: Ralph Hopping	
Approximate Acreage: 25,300	
Percentage of Ownership(For	vate: <u>50%</u> est Service: <u>50%</u> ional Park;
	Yellow Pine Sugar Pine
Approximate Stand of Timber (MBM) <u>255,500</u> <u>370,500</u>
Number of Trees Examined:	
Number of Trees Counted:	35 44
Converting Factor Used:	
Number of Infested Trees (estimated from Factor):	140 176
Average Board Foot Volume per	Tree: 2.500 6.000
Total Amount of Timber Killed, 1916 and 1917:	350,000 2556,000
Condition of Infestation:	
Primary Insects: D.brevi	comis and D.monticolae
Status (1917): Increasir	g Decreasing Balanced
yes	
Further Data: (seriousness of ity of timber,	present infestation, accessibilate.)
Added 1-1/2 millions infer	sted (girdled) 40 acres of sugar
ine. The infestation is pretty	heavy in the sugar pine stands
and will probably increase still	l further from the broods bred
in the girdled 40 acres.	

Unit No. 20-A	Name: 1	atterson Moun	tain
Period of Examination:	August 2]	. 1917.	
Examiner: Ralph Hopping			
Approximate Acreage: 12,	200		pt-
Percentage of Ownership	(Private: -(Forest Se (National	rvice: 99%	
		Yellow Pine	Sugar Pine
Approximate Stand of Timb	er (MBM)	226,500	145,500
Number of Trees Examined:		none	none
Number of Trees Counted:		10	3
Converting Factor Used:			
Number of Infested Trees (estimated from Fact	or):	60	18
Average Board Foot Volume	per Tree:	1,300	2,500
Total Amount of Timber Ki 1916 and 1917:	lled,	78,000	45,000
Condition of Infestation:			
Primary Insects: D.	bravicemis	and D.montic	olaa
Status (1917): <u>Incr</u>	reasing De	creasing Bala	anced
Further Data: (seriousnes	es of prese	nt infestatio	n, accessibil
Rather scattering inf	estation no	t at present	serious
A STATE OF THE STA			

Unit No.	21	Name:	Blue Canyon	
Period of I	Examination: _	Actual work	in spring 191	7
Examiner:	Roy Boothe			
Approximate	e Acreage:1	2,600		
Percentage	of Ownership-	(Private:(Forest Se (National	rvice: ord	
			Yellow Pine	Sugar Pine
Approximate	e Stand of Tim	ber (MBM)	_230,500	12,000
Number of	Trees Examined	.;	288	5
Number of	Trees Counted:			
Converting	Factor Used:			
	Infested Trees mated from Fac		282	5
Average Bo	ard Foot Volum	ne per Tree:	1,382	4,666
	nt of Timber P and 1917:	Killed,	340.040	23,330
Condition	of Infestation	1:		
Prima	ry Insects: _	D.brevicomi	s and D.montic	olae
Statu	is (1917): <u>Inc</u>	creasing De	creasing Bala	nced
	_	Project w	orked 1917	
Further Do	ta: (seriousno ity of tim	ess of presember, etc.)	nt infestation	n, accessibil
Inf	estation had	lecreased fr	om that of 191	5

Unit No. 22 Name: 8	tevenson Cree	k
Period of Examination: Aug. 3 to 6.	1917.	
Examiner: Ralph Hopping		-
Approximate Acreage: 2.240		
Percentage of Ownership(Forest Se (National	rvice: 1004	
	Yellow Pine	Sugar Pint
Approximate Stand of Timber (MBM)	21,500	6,500
Number of Trees Examined:	133	7
Number of Trees Counted:	31	none
Converting Factor Used:	4	
Number of Infested Trees (estimated from Factor):	133	7
Average Board Foot Volume per Tree:	1,374	2,648
Total Amount of Timber Killed, 1916 and 1917:	182,700	18,540
Condition of Infestation:		
Primary Insects: <u>D. brevicom</u>	is and D. mont	icolae
Status (1917): <u>Increasing</u> <u>Dec</u>	creasing Bala	nced
Further Data: (seriousness of preser ity of timber, etc.)	nt infestation	; accessibil-
This area is apidemic and a	ccessible, be	ing adjacent
to the line of the San Joaquin &	Bastern RR. wi	l-bhr a
railroad station on the area.		

Unit No. 22-A Name: Jose Basin
Period of Examination: August 24, 1917.
Examiner: Ralph Hopping
Approximate Acreage: 10.400
Percentage of Ownership(Forest Service: 80% (National Park:
Yellow Pine Sugar Pine
Approximate Stand of Timber (MBM) 91,500 17,000
Number of Trees Examined: none
Number of Trees Counted:
Converting Factor Used:
Number of Infested Trees (estimated from Factor): 22
Average Board Foot Volume per Tree: 1.374
Total Amount of Timber Killed, 1916 and 1917: 30.228
Condition of Infestation:
Primary Insects: <u>D. bravicomis</u>
Status (1917): <u>Increasing Decreasing Balanced</u>
Further Data: (seriousness of present infestation, accessibil ity of timber, etc.)
Control work in 1913 and again in 1914. Only 3 trees
in 1915.

Unit No. 23 Name:	Big Creek		
Period of Examination: August	23 and 24, 1917.		
Examiner: Ralph Hopping			
Approximate Acreage: 12,000			
Percentage of Ownership (Fores	te: 8% st Service: 92% onal Park;		
	Yellow Pine	Sugar Pine	
Approximate Stand of Timber (MF	BM) 122.000	44,000	
Number of Trees Examined:	none	none	
Number of Trees Counted:	57	6	
Converting Factor Used:			
Number of Infested Trees (estimated from Factor):	228	24	
Average Board Foot Volume per Tr	ree: 1.374	2,648,	
Total Amount of Timber Killed, 1916 and 1917:	313,272	63,552	
Condition of Infestation:			
Primary Inseats: D. brevio	comis and D. monti	colae	
Status (1917): Increasing	Decreasing Bala	inced	
установания проведения проведения проведения проведения проведения проведения проведения проведения проведения			
Further Data: (seriousness of present infestation, accessibility of timber, etc.)			
Epidemic and accessible. Several railroad stations			
of the San Joaquin & Eastern RR are upon the area.			

Unit No. 24. Name:	Hogue Ranch	
Period of Examination: Extensive example	minstion, 1914	to 1917.
Examiner: Relph Hopping		
Approximate Acreage: 18.800		
Percentage of Ownership(Forest Set (National)	rvice: gad	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	254,000	79.000
Number of Trees Examined:	none	
Number of Trees Counted:	74	-
Converting Factor Used:	3	
Number of Infested Trees (estimated from Factor):	222	_
Amerage Board Foot Volume per Tree:	1,400	
Total Amount of Timber Killed, 1916 and 1917:	310,800	•
Condition of Infestation:		
Primary Insects: D. brevicomis		
Status (1917): <u>Increasing</u> <u>Dec</u>	reasing Balan	ced
- 708		
Further Data: (seriousness of presentity of timber, etc.)	t infestation,	accessibil-
Fairly accessible. This is the or	nly part of a v	very large
comprehensive area (with the exception	on of the small	Jackass
Unit) not worked in the control wo:	rk of 1917.	

Unit No. 25	Name:	Rock Creek	
Period of Examination:	Actual cont	col work sprin	g. 1917.
Examiner: A. K. Wot	ford		
Approximate Acreage: _	5.920		
Percentage of Ownershi	(Private: 1 p(Forest Se (National	rvice: and	
		Yellow Pine	Sugar Pine
Approximate Stand of T	imber (MBM)	60.500	48,500
Number of Trees Examin	ed:	94	19
Number of Trees Counte	d:		-
Converting Factor Used	:		
Number of Infested Tre		94	19
Average Board Foot Vol	ume per Tree:	1,165	3,130
Total Amount of Timber 1916 and 1917: 1	Killed, 't.b.m.	109,480	59,470
Condition of Infestati	on:		
Primary Insects:	D. brevicomia	and D. monti	colae
Status (1917): <u>I</u>	ncreasing Dec	reasing Bala	nced
		yoa	
Further Data: (serious ity of t	ness of preser imber, etc.)	t infestation	, accessibil-
This is a record	of the sotual.	trees trested	in the
control work in May an	d June, 1917.	For annual 1	oss the
fall infestation shou	ld be added.		
		K 4 TO BACK	

Unit No. <u>26</u> Name	: Chiquito
Period of Examination: Actua	1 work, spring 1917
Examiner: Chester A. Jordan	
Approximate Acreage: 13.600	
Percentage of Ownership (Fore	vate: 150 est Service: 050 ional Park:
	Yellow Pine Sugar Pine
Approximate Stand of Timber (1	MBM) 203,500 47,500
Number of Trees Examined:	494 32
Number of Trees Counted:	
Converting Factor Used:	
Number of Infested Trees (estimated from Factor):	494 - 38
Average Board Foot Volume per	Tree: 1,080 -1,081
Total Amount of Timber Killed, 1916 and 1917:	-523,232 - 52,590 -
Condition of Infestation:	
Primary Insects: n. bres	vicomis and D. monticolas
Status (1917): Increasin	g Decreasing Balanced
Further Data: (seriousness of ity of timber, e	present infestation, accessibil-
95 additional trees had tur	ned up after the control work
by July 1, 1917. This is a re	cord of the actual insect control
work, spring of 1917.	
	(12) (H (14)) (H) (12)

Unit No. 27	Name:	Jackass	
Period of Examination:	July, 191	6	
Examiner: Ralph Hopping			
Approximate Acreage:	5,120		
Percentage of Ownership	(Private: (Forest S (National	ervice: 95%	
		Yellow Pine	Sugar Pine
Approximate Stand of Timbe	r (MBM)	69,000	8,000
Number of Trees Examined:		none	•
Number of Trees Counted:		43	2
Converting Factor Used:			2
Number of Infested Trees (estimated from Facto	r):	86	4
Average Board Foot Volume	per Tree:	1,114	2,000
Total Amount of Timber Kill 1916 and 1917:	led, B.M.)	95,804	8,000
Condition of Infestation:			
Primary Insects: 'D. brevicomis in vellow pine and D. jeffreyi in Jeffrey pine. Status (1917): Increasing Decreasing Balanced yes			
Further Data: (seriousness ity of timbe		nt infestation	, accessibil-
This unit becomes enti	rely isol	ated on accoun-	t of the control
work on the Chiquito,	the only c	ontiguous pine	area. Only
accessible by 30 miles of trail from North Fork.			

Unit No. 28 Name:]	Dalton		
Period of Examination: June 17 and 18, 1917			
Examiner: J. M. Miller and Ralph Ho	opping		
Approximate Acreage: 23,700			
Percentage of Ownership(Forest Sei (National	rvice: 100% Park;		
	Yellow Pine	Sugar Pine	
Approximate Stand of Timber (MBM)	241,500	63,000	
Number of Trees Examined:	16	3	
Number of Trees Counted:	241	56	
Converting Factor Used:		3	
Number of Infested Trees (estimated from Factor):	482	112	
Average Board Foot Volume per Tree:	1,161	4.050	
Total Amount of Timber Killed, 1916 and 1917: (Ft.B.M.)	559,602	453,600	
Condition of Infestation:			
Primary Insects: D. brevicomis	D. jeffreyi.	D. monticolae	
Status (1917): <u>Increasing Decreasing Balanced</u>			
Further Data: (seriousness of present infestation, accessibility of timber, etc.)			
- A good commorcial stand only ac	cossible by	trail from	
Huntington Lake. Dedidedly epider	nte		

Unit No. 29 Name:	and & Whiskey	Crooks.
Period of Examination: Actual work	spring and su	ımmer 1917
Examiner: White & Frient Lumber Co).	
Approximate Acreage: 24,500		
Percentage of Ownership(Forest S (National	Discourse Character	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	266,500	403,500
Number of Trees Examined:		360
Number of Trees Counted:		
Converting Factor Used:		
Number of Infested Trees (estimated from Factor):	341	360
Average Board Foot Volume per Tree:	1.100	4,810
Total Amount of Timber Killed, x1916 and 1917: (Ft. B.M.) Condition of Infestation:	375,100	1,731,600
Primary Insects: D.brevicomis	and D. montico	lae
Status (1917): <u>Increasing</u> <u>De</u>	creasing Bala	nced
<u>ves</u>		
Further Data: (seriousness of prese ity of timber, etc.)	nt infestation	, accessibil-
Worked 1917 by the White & Fri	ant Lbr. Co.,	cooperating
with the Forest Service. This i	s an actual re	cord of infested
timber minus the fall infestation	n,	

Unit No. 30 Name: Wil	low Creek	
Period of Examination: July 16 - 20	. 1917.	
Examiner: J. E. Patterson		
Approximate Acreage: 23,000 (Range	of elev: 3	5500 to 5000')
Percentage of Ownership(Forest Serv (National Pa	rice: 84%	
y and the second se	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	193,500	33,000
Number of Trees Examined:	3	
Number of Trees Counted:	38	1
Converting Factor Used:		4
Number of Infested Trees (estimated from Factor):	152	4
Average Board Foot Volume per Tree:	1.000	3.000
Total Amount of Timber Killed, 1916 and 1917: B.M.)	152,000	12,000
Condition of Infestation:		
Primary Insects: _D. brevicemis a	and D. mon	cicolae
Status (1917): Increasing Decre	easing Ba	lanced
		Yes
Further Data: (seriousness of present ity of timber, etc.)	infestatio	on, accessibil-
The infestation occurs mostly in	the suppre	ssed stands on
the ridges. The infested trees wou	ld produce	only a poor grade
of lumber. The extrene southern and	northern	ends of the unit
did not come under sotual observation	n owing to	the inaccessibili
The central portion only is readily	accessible	

unit No. 31 Name:	Lesuo urver	
Period of Examination: July 16 - 2	20. 1917.	
Examiner: J. E. Patterson		
Approximate Acreage: 34,000 (Elev:	3.000 to 5.50	0')
Percentage of Ownership(Forest Se (National	rvice: 65%	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	184,000	50,500
Number of Trees Examined:	4	2 S
N'umber of Trees Counted:	48	8
Converting Factor Used:		
Number of Infested Trees (estimated from Factor):	192	32
Average Board Foot Volume per Tree:	2,500	6,500
Total Amount of Timber Killed, 1916 and 1917: (34.3.M.)	430,000	308,000
Condition of Infestation:		
Primary Insects: D. brevicom	is & D. monti	colae.
Status (1917): <u>Increasing</u> <u>Dec</u>	reasing Bala	nced
		08
Further Data: (seriousness of presentity of timber, etc.)	t infestation	, accessibil-
Only the central and N.E. port	ions of this	unit supports
a marchantable stand of timber. The	infestation	is confined
meinly to these sections where some	fine specimen	s of both sugar
and yellow pine are infested. The	northern 1/4	has been com-
pletely logged off. The southern and timbered and support a heavy stand of only is not readily accessible.		

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UNITS OF INFESTATION

Unit No. 32

Name: Mt. Raymond

Period of Examination: July 24 - 8	28, 1917.	
Examiner: J. E. Patterson		
Approximate Acreage: 14.000 (Range	of elev: 50	00 to 6500')
Percentage of Ownership (Forest Sei (National	50% rvice: 30% Park: 2	0%
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	105,000	336,000
Number of Trees Examined:	3	2
Number of Trees Counted:	22	14_
Converting Factor Used:		3
Number of Infested Trees (estimated from Factor):	66	48
Average Board Foot Volume per Tree:	2,500	6.500
Total Amount of Timber Killed, 1916 and 1917: (Ft. B.M.)	165,000	273.000
Condition of Infestation:		
Primary Insects: D. brevicom	is & D. monti	lcolae.
Status (1917): Increasing Dec	reasing Bala	nced
		768
Further Data: (seriousness of presentity of timber, etc.)	t infestation	i, accessibil-
Some fine specimens of both sugar an	d vellow pine	have been killed
on this unit, the these insect kills	d trees repre	sent only a small
percentage of the stand. On private	ly owned lan	ds, aggregating
50% of the area the timber is being	logged. This	condition may ter
to hold the infestation to the logge	d areas. On	ly the western
portion is readily accessible.		

Unit No.	33	Name	9:	Wawona	
Period on	f Examination:	July	20-24,	1917.	
Examiner	J. E. Patterso	n			
Approxim	ate Acreage: 18	.000	(Range	of elev: 400	00 - 65001)
Percenta	ge of Ownership	-(For	vate: est Ser ional E	vice: 15%	2.5%
				Yellow Pine	Sugar Pine
Approxim	ate Stand of Time	per (MBM)	140,000	356,500
Number o	f Trees Examined	•		18	22
Number o	of Trees Counted:			37	16
Converti	ng Factor Used:			2	.5
Number (es	of Infested Trees stimated from Fac	tor):		92	40
Average	Board Foot Volum	e per	Tree:	2.500	6.500
Total Ar	mount of Timber K 16 and 1917: (F	illed	,)	230,000	260,000
	on of Infestation				
Pr	imary Insects:	D.bre	vicomis	and D. mont	icolas
St	atus (1917): <u>Inc</u>	reasi	ng Dec	reasing Bal	anced
					уев
Further	Data: (seriousne ity of time	ess of aber,	presen	nt infestatio	n, accessibi

Insect damage to the better grade of both Sugar and Yellow pine is confined mainly to the central portion of this unit. Here some of the best trees have been killed. The timber around this control area has been suppressed owing to the poorer soil conditions: hence the dwage is not so serious. The southern portion has been logged, leaving no timber. With the exception of the central portion, the unit is not easy of access.

Unit No. 34 Name: 1	Iron Mountain
Period of Examination: July 8 - 12	2, 1917.
Examiner: J. E. Patterson	
Approximate Acreage: 3,600 (Range	of Elev: 4500 to 7000')
Percontage of Ownership(Forest Sei (National	rvice: and
	Yellow Pine Sugar Pine
Approximate Stand of Timber (MBM)	49,500 81,500
Number of Trees Examined:	3 3
Number of Trees Counted:	10 14
Conwerting Factor Used:	3
Number of Infested Trees (estimated from Factor):	30 42
Average Board Foot Volume per Tree:	2,000 5,000
Total Amount of Timber Killed. 1916 and 1917: (Ft. B.M.)	60,000 210,000
Condition of Infestation:	
Primary Insects: D. brevicomis	and D. monticolae
Status (1917): Increasing Dec	reasing Balanced yes
Further Data: (seriousness of presenty of timber, etc.)	t infestation, accessibil-
Only the eastern slope of the Ch	owchille Mts. in this unit
Supports a marchantable stand of time	ber. A small passentage of
this stand, both sugar and vellow pi	ne, have been killed by beet les
With the exception of the extreme no	orthern portion, the timber is
readily accessible from the Signal I	Peak Road.

Name:

Unit No. 35

Chowchilla

Period of Examination: July 12 - 1	6, 1917.	
Examiner: J. E. Patterson		
Approximate Acreage: 13,000 (Range	e of Elev: 30	00 to 5500')
(Private: Percentage of Ownership(Forest Se	rvice: 75%	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	105,500	18.000
Number of Trees Examined:	5	
Number of Trees Counted:	27	6
Converting Factor Used:		
Number of Infested Trees (estimated from Factor):	81	18
Average Board Foot Volume per Tree:	2,000	5,000
Total Amount of Timber Killed, 1916 and 1917: (Ft. B.M.)	162.000	90,000
Condition of Infestation:		
Primary Insects: D. brevicom	is and D. mont	icolae
Status (1917): Increasing Dec	reasing Bala	nced
	y e	18
Further Data: (seriousness of presenty of timber, etc.)	t infestation	, accessibil-
In general, only the suppressed to	ees on the ex	posed ridges
ave suffered from insect attack. A fe	w trees in th	e better stands
n the extreme north end have been kil	led. The sou	thern portion is
sparcely timbered and supports a heavy	stand of bru	sh. Practically
the entire unit is readily accessible	from the nume	rous roads and
crails which traverse it.		

Unit No. 36 Name:	Signal Peak	
Period of Examination: July 10-1	15, 1917	
Examiner: J. E. Patterson		
Approximate Acreage: 11.500 (E)	levations: 3500	to 6500')
Percentage of Ownership(Forest (National	65% Service: 35% Park:	
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	144.000	88.500
Number of Trees Examined:	4	5
Number of Trees Counted:	18	39
Converting Factor Used:		2.5
Number of Infested Trees (estimated from Factor):	45	97
Average Board Foot Volume per Tree	2.000	6.000
Total Amount of Timber Killed, 1916 and 1917: (Ft. B.M.)	90.000	582,000
Condition of Infestation:		
Primary Insects: D. brevi	lcomis and D. Mo	onticolae
Status (1917): Increasing D	ecreasing Bala	nced
		Zea
Further Data: (seriousness of pres ity of timber, etc.)	ent infestation	, accessibil-
The infestation is almost entirely Footman Mt here it occurs in the bo	confined to the	ne crest of the
yellow pine. Some fine specimens of h		
Tho they represent only a small portion		
along the crest of the mountain have b	nean struck fly	ightning within
the past year and are now dead. Only by beetles. The unit is not read	a few of them	showed attack
ragged topography.		

Unit No. 37	Tame: M	ariposa	
Period of Examination:	1y 10 -	15, 1917.	Sales Administra
Examiner: # E. Patterso	n		
Approximate Acreage: a 500.	(Eleva	tions: 4.000	to 5.000')
Percentage of Ownership (Private: Forest Se National	rvice: 60% Park:	
		Yellow Pine	Sugar Pine
Approximate Stand of Timber	(MBM)	82,500	14,000
Number of Trees Examined:		24	3
Number of Trees Counted:		50_	3
Converting Factor Used:			2.7
Number of Infested Trees (estimated from Factor):	135	8
Average Board Foot Volume I	er Tree:	2,000	4.000
Total Amount of Timber Kill 1916 and 1917: (Ft.	ed, B.M.)	270,000	32.000
Condition of Infestation:			
Primary Insects:) brevio	omis and D. m	onticolae
Status (1917): Incres	nsing De	creasing Bal	anced
		?	3
Further Data: (seriousness ity of timber	of preser, etc.)	ent infestatio	n, accessibil-
Some control work was	done on t	this unit in 1	914. A number of
trees were treated at this	time. The	infestation	at present is general
over the entire unit thes n	ot aggre	sive. The st	and of timber is of
medium grade. The infested	trees a	co mostly of t	the suppressed type.

This would indicate decreasing infestation. The unit is mostly easy

of access from the numerous roads and trails.

Unit No. 38 Name:	Alder Creek	
Period of Examination: Sept. 16-1	7, 1917.	
Examiner: J. E. Patterson		
Approximate Acreage: 24.000 (Elev: 4500 to	6500')
Percentage of Ownership(Forest S (National	ervice: 284	0%
	Yellow Pine	Sugar Pine
Approximate Stand of Timber (MBM)	134,500	17.500
Number of Trees Examined:		
Number of Trees Counted:	19	7
Converting Factor Used:		1
Number of Infested Trees (estimated from Factor):	76	28
Average Board Foot Volume per Tree:		4.000
Total Amount of Timber Killed, 1916 and 1917: (Ft.B.M.)		
Condition of Infestation:		
Primary Insects: D. brevicom	nis and D. mont	icolae
Status (1917): <u>Increasing</u> <u>Dec</u>		nced
Further Data: (seriousness of presentity of timber, etc.)	t infestation,	accessibil-
Some control work was done on this un	it in 1916.	36 trees both
Sugar and yellow pine were treeted. A f		
have been killed subsequent to control the		
at present confined to the suppressed and		
the center of this unit is readily access		

SUMMARY.

Name of Plot: Wawona - Mariposa	- Extensive	
Location: National Forest Sierra		
T, R	, Sec	
Description of Boundaries: The plot	s were not lar	ge enough
to give any adequate averages: there	efore. the int	ensive
data was summarized for the whole as	rea.	
Acreage:		
Period of Examination: July 13 to	27, 1917.	
Examiner: John E. Patterson		
	72 - 71 M	
	Yellow Pine	(B.M.)
Approximate Stand of Timber (MBM):		
Number of Trees Counted (Extensive work - spotted):		
Number of Trees Examined: Infested:	5	34,400
Abandoned: In 1917	7	17,510
Prior to 1917	39	89,130
Total:	51	141,040
Resulting Factor	Average Park	
Average dia. 33.6" - Avera	ge B.M. 2.765	ft.

Name of Pl	ot: WAW	ONA			
Location:	National	Forest _	Sierra		
	T. 5 S	. R.	21 E.	. Sec. 2	
Descriptio	n of Boun	daries: _	Sectio	n lines	
Acreage: _	640				
Period of H	Examinatio	n: July	24 and	25, 1917.	
Examiner:	John E.	Patterso	n		
Approximate	Stand of	Timber (MBM):	Yellow Pine	Ft.B.M.
Number of T (Extensiv	rees Coun e work -	ted spotted):			
Number of T		ined: Infested:		none	0
	I	abandoned In 1917	•	2	4,720
		Prior to	1917	16	31,080
	To	tal:		18	35,800
Resulting Fa	actor				
	e dia				
Averag	e B.M	1,988 ft.			

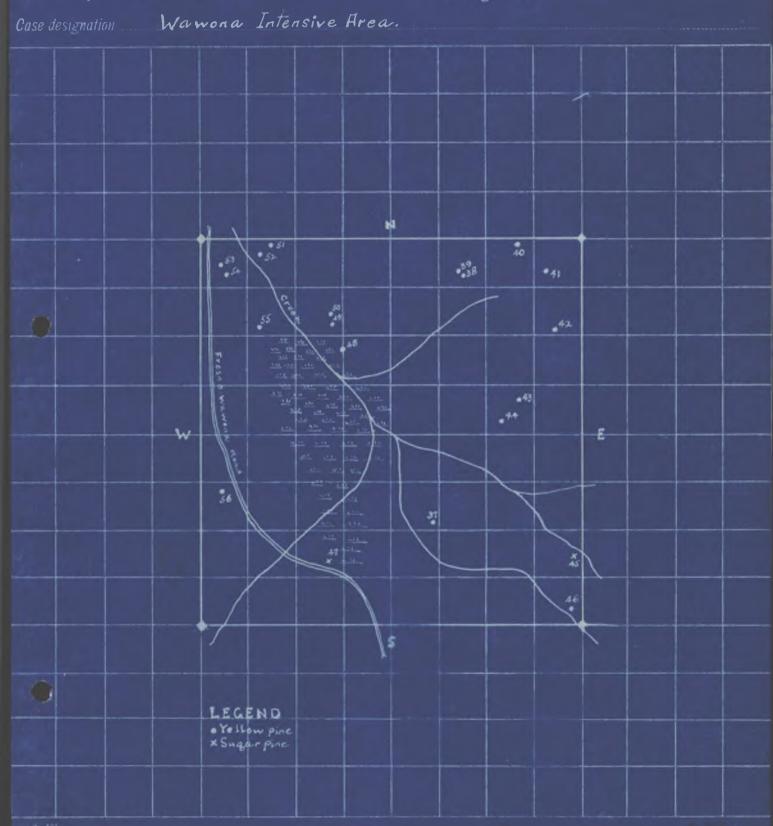
Name of Plo	t: WAWC	NA			
Location:	National	Forest	Sierra		
	T. 5 S	, R.	21 E.	Sec. 2	
Description	of Bound	laries:	Section	lines	
Acreage: _6	540				
Period of E	xaminatio	n:	uly 24 a	nd 25, 1917.	
Examiner:	John :	E. Patte	rson		
Approximate	Stand of	Timber	(MBM):	Sugar Pine	(Ft.b.m.)
Number of T: (Extensive	rees Coun e work -	ted spotted)			
Number of Tr		ined: Infested	:	1	1,630
		Abandone In 1917			
		Prior t	0 1917	1	5,230
	T	otal:		2	6,860
Resulting Fa	actor				

UNITED STATES DEPARTMENT OF AGRICULTURE

Sierra National Forest, State of California , Land District ...

Sec. 2 7. 55 R. 21E , M.O. Mer. Area 640 acres. Scale 4 inches 1 mile.

Field work by J.E.Patterson, Variation, Date July 1917, Platted by Patterson



DIAMETER AND VOLUME OF TREES

WAWONA

Diameter:	Number of Trees :	Volume (board feet)
	Yellow Pine	
12"	rellow Pine	
14 :		
7.0		
		700
20 :	1	320
22 ;		480
04		
24 :	2	2,040
26 :	3	3,120
28 ;		1,460
30 :	3 2	1,460 5,160
32 :	2	4.020
34 :		
36 :	3	8,900
38 :		
40 :	1	3.700
48 :		6,600
		公里等的政治的 国际公司的
	THE RESERVE THE PROPERTY OF THE PARTY OF THE	
See .		The waster of the section of
	AND ENGINEERING THE	THE PROPERTY OF THE PARTY OF THE PARTY OF
542	Heats continues and making	Market Market Ball
Total :	18	35,800
	Sugar Pine	
3011		
12" :		
14 :		
14 16		
14 16 18		
14 16 18 20		
14 16 18 20 22		
14 16 18 20 22 22		
14 16 18 20 22 24 26		
14 16 18 20 22 24 26 28		
14 16 18 20 22 24 26 28		
14 16 18 20 22 24 26 28 30 32	1	1.630
14 16 18 20 22 24 26 28 30 32 34		1,630
14 16 18 20 22 24 26 28 30 32 34		1.630
14 16 18 20 22 24 26 28 30 32 34		1,630
14 16 18 20 22 24 26 28 30 32 34 36 38		1.630
14 16 18 20 22 24 26 28 30 32 34 36 38 40		
14 16 18 20 22 24 26 28 30 32 34 36 38		1.630
14 16 18 20 22 24 26 28 30 32 34 36 38 40		
14 16 18 20 22 24 26 28 30 32 34 36 38 40 46		5.230
14 16 18 20 22 24 26 28 30 32 34 36 38 40	1	

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Name of Pl	ot: MARIPUSA		
Location:	National Forest Sier	ra	
	T. 48 , R. 19 E	, Sec. <u>27</u>	and 34
Des,cription	n of Boundaries: Section	n lines	
Acreage: _	640		
Period of 1	Examination: July 15 to	16, 1917.	
Examiner:			
		Yellow Ping	(Ft.B.M.)
Approximate	e Stand of Timber (MBM):	2.502	(FU.D.M.)
	Prees Counted ve work - spotted):		
Number of 9	Prees Examined: Infested:	3	27,720
	Abandoned: In 1917	2	5,760
	Prior to 1917	19	45,380
	Total:	24	78,860
Resulting F	actor		
Average	dia. 35.9"		
Average	B.M. 3,285 ft.		

Name of Plot: Mariposa		
Location: National Forest Sier	ra	
T. 4 S. , R. 19 E.	, Sec. 2	7 and 34
Description of Boundaries: Secti		
Acreage: 640		
Period of Examination: July 1 5 to	16, 1917.	
Examiner: John E. Patterson		
	Sugar Pine	(Ft.B.M.)
Approximate Stand of Timber (MBM):	126	
Number of Trees Counted (Extensive work - spotted):		
Number of Trees Examined: Infested:		40
Abandoned: In 1917		
Prior to 1917	3	30,900
Total:	3	30.900
esulting Factor		
Average dia 66.6" Average B.M 10.300 ft.		

Form 878 (Revised Oct. 15, 1913)

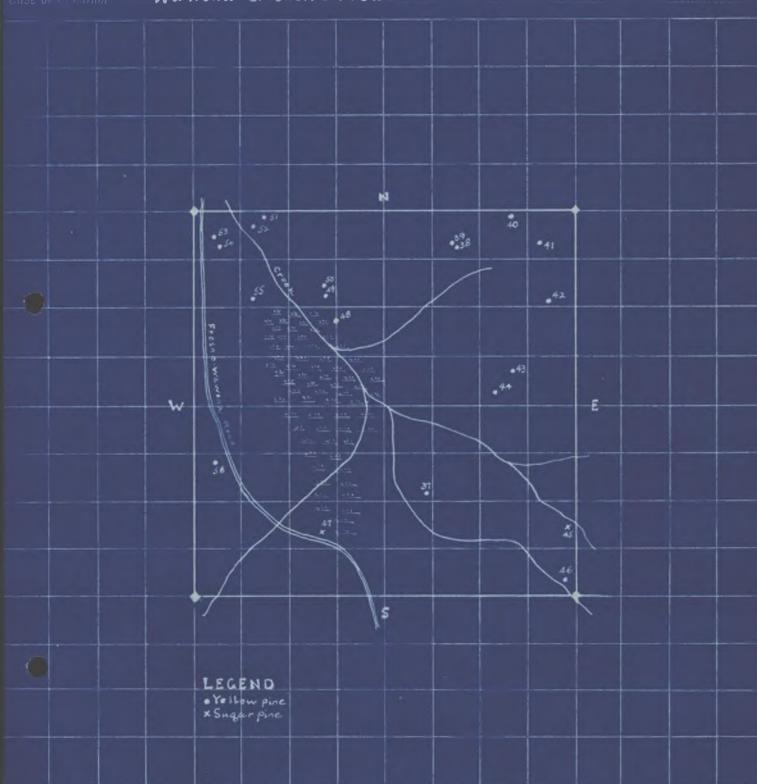
UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

Sierra National Forest, State of California, Land District

Sec. 2 T. 55 R. 21E , M.O. Mer. Area 640 weres. Scale 4 inches 1 mile.
Fold work by J.E.Patterson , Variation , Date July 1917 , Platted by Patterson

Case des mation Warna Intensive Area.



DIAMETER AND VOLUME OF TREES

MARIPOSA

Diameter:	: Number of	Trees : Volume (board feet)	
	Vollaw Dime		120
12"	Yellow Pine		
14			
16			1
18			
20			
22			
24			
26			-
28	5 7 4 16 5	7 000	
30	5	3.980 8.400 5.780 8.900 9,100	
32	3	5,400 5,700	
34	4	9,760	
36	3	9,300	
38	100000000000000000000000000000000000000	3,100	51-
40	2	: 7,700	3- 5
48	.3	7,700	
82	1	: 14,000 : 21,000	
		. 61,000	-
1 1 1 1 1 1 1 1 1 1 1	STATE OF THE PARTY		- 1
	SIN BURELLE		-
862			
m			
Total :	24	78,860	
		78,860	
	Sugar Pine	78,860	
		78,860	
12"		78,860	N. C.
12"		78,860	
12" 14 16		78,860	
12" 14 16 18		78,860	
12" 14 16 18 20		78,860	
12" 14 16 18 20 22		78,860	
12" 14 16 18 20 22 24		78,860	
12" 14 16 18 20 22 24 26		78,860	
12" 14 16 18 20 22 24 26 28		78,860	
12" 14 16 18 20 22 24 26 28 30		78,860	
12" 14 16 18 20 22 24 26 28 30 32		78,860	
12" 14 16 18 20 22 24 26 28 30 32 34		78,860	
12" 14 16 18 20 22 24 26 28 30 32 34 36		78,860	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		78,860	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40			
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 64			
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 64 66		9.430 11,090	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 64			
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 64 66		9.430 11,090	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 64 66		9.430 11,090	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 64 66 70	Sugar Pine	9.430 11,090 10.480	
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 64 66		9.430 11,090	

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Name of Plot: E	xtensive - Patters	son	
Location: Nation	nal Forest Sierre		
т	-, R.	, Sec.	
Description of Bo	oundaries:		
Acreage:			
Period of Examina	tion: July 13 t	0 27, 1917.	
Examiner: John	E. Patterson.		
Approximate Stand	of Minhon (Repres)	Yellow Pine	(Ft.B.M.)
Number of Trees Co (Extensive work	ounted - spotted):		
Number of Trees E			
	Infested:	2	6,680
Carmon Dina	Abandoned: In 1917	3	7,030
Sugar Pine, 1 tree - 2,790	ft.)Prior to 1917	4	12,670
infested.	Total:	9	26.380
Resulting Factor		2.	the transfer of the
Average dia. 34	.4"		

Aver e B.M. - 2,931 ft.

DIAMETER AND VOLUME OF TREES

Extensive - Patterson

Diamatan	NT1 C M	77-7
Diameter	Number of Trees	: Volume (board feet)
	Yellow Pine	
12"	TOTION TITO	
14		•
16	MODELLING CONTRACTOR OF THE PARTY OF THE PAR	Control Control Control Control Control Control
18		Land of the party of the second of the secon
20		Institution of the second of t
22	2	930
24		y to head only a selection and a little of
26	1	: 1,230
28		the common than the common than the
	CONTRACTOR DESCRIPTIONS	: 1,720
32 34		
36		E 000
38	2	5,800 : 3,300
40		. 0.000
46	7	6 100
54	1	: 6.100 : 7.300
		: 7.000
N	March Market Land March	A contract contract to the contract of the con
	STREET, PARKETON BUSINESS	Remark and the second section of the second
A Maria		: What is the second of the second
310	DI.9 TITLE AND A	26,380
Total	And the second second second	
	Sugar Pine	
	:Sugar Pine	
	Sugar Pine	
12" 14 16		
12" 14 16 18		
12" 14 16 18 20		
12" 14 16 18 20 22		
12" 14 16 18 20 22 24		
12" 14 16 18 20 22 24 26		
12" 14 16 18 20 22 24 26 28		
12" 14 16 18 20 22 24 26 28 30		
12" 14 16 18 20 22 24 26 28 30 32		
12" 14 16 18 20 22 24 26 28 30 32 34		
12" 14 16 18 20 22 24 26 28 30 32 34 36		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		2,790
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40		2,790

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Name of Plot:	Stevenson Creek			
Location: Na	tional Forest Sierr	28.		
T.	9 S , R. 24 E	, Sec. 10	,11,12,13,14,	
Description of	f Boundaries: The Ste	venson Creek	area is	part
included in t	hat part of the waters	hed of the cre	ek between	
	a on the west and the			
Acreage: 2,2	40			
Period of Exam	mination: August 15-	22, 1917.		
Examiner: Re	alph Hopping			
74-1		Yellow Pine	SECRETARIES	
Approximate St	and of Timber (MBM):	11.878	(Ft.B.M.)	
Number of Tree (Extensive w	es Counted vork - spotted):	31		
Number of Tree	s Examined: Infested:	30	62,020	
	Abandoned: In 1917	103	120,680	
	Prior to 1917			
	Total:	133	182,700	
Resulting Fact	or		4	
	iam 28.3"			
Average B	.M 1 374 Pt			

Name of Plot	: Stevenson Cre	eek		
Location: N	ational Forest	Sier	ra	100
T	. 98 , R.	24 E	, Sec.	
	of Boundaries:S		THE RESERVE OF THE PROPERTY OF	tion
under y	ellow pine			
	Market Carlos Spring			
Aamaama	2.240			
Period of Ex	amination: Augus	t 15-2	2, 1917	
Examiner:	Ralph Hopping			
			Sugar Pine	(Ft.B.M.)
Approximate S	stand of Timber (M	BM):	2,762	
Number of Tre (Extensive	ees Counted work - spotted):			
Jumber of Tre	es Examined: Infested:		3	3,660
	Abandoned: In 1917		4	14,880
	Prior to 1	917	40	
	Total:		7	18,540
esulting Fac	tor			
Averege die	ZN AR			

Average B.M. - 2,648

DIAMETER AND VOLUME OF TREES

Diameter	: Number of T	rees : Volume (board feet)
2.011	Yellow Pine	
12"	2 3	120
14		: 250
16	9	: 1.360
18	8	: 1.480
	10	3,260
22	9	: 3,300
~ エ	: 13	: 6,730
NO.	: 13	6.730 : 9.290 : 9.800 : 7.210
	10	; 9,800
30	6	: 7.810
02	: 10	: 15.660
	: 8	: 15.840
	: 9	: 20.100
38	; 8	: 20.800
40	: 2	: 6.600
42	: 4	: 14.800
44 46	: 2	: 7.800
4.6	: প্র	: 14,200
	: 8	: 9,800
	1	: 5,700
	: 1	: 8,600
3,760 Total	133	182,700
10041	The state of the s	
	Sugar Dina	
	Sugar Pine	
12"		
12"	Sugar Pine	
14		
14 16		
14 16 18	5 :	250
14 16 18 20	5 :	: 250
14 16 18 20 22	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	250 220
14 16 18 20 22 22	5 : 5 : 1 : 1	
14 16 18 20 22 24 26	5 : 5 : 1 : 1	
14 16 18 20 22 24 26 28	5 : 5 : 1 : 1	
14 16 18 20 22 24 26 28 30	5 : 5 : 1 : 1	
14 16 18 20 22 24 26 28 30 32	5 : 5 : 1 : 1	
14 16 18 20 22 24 26 28 30	5 : 5 : 1 : 1	
14 16 18 20 22 24 26 28 30 32	5 : 5 : 1 : 1	
14 16 18 20 22 24 26 28 30 32 34 36	3	: 220
14 16 18 20 22 24 26 28 30 32 34 36 38 40		: 220 : : : : : : : : : : : : : : : : : :
14 16 18 20 22 24 26 28 30 32 34 36 38 40 42	: 5 : 5 : 1 : 1 : 1 : 2	: 220 : : : : : : : 2,530 : 5,760
14 16 18 20 22 24 26 28 30 32 34 36 38 40	: 5 : 1 : 1 : 1 : 1 : 2	: 220 : : : : : : : : : : : : : : : : : :
14 16 18 20 22 24 26 28 30 32 34 36 38 40 42	: 5 : 5 : 1 : 1 : 1 : 1 : 2	: 220 : : : : : : : 2,530 : 5,760
14 16 18 20 22 24 26 28 30 32 34 36 38 40 42	: 5 : 1 : 1 : 1 : 2 : 2 : 2	: 220 : : : : : : : 2,530 : 5,760
14 16 18 20 22 24 26 28 30 32 34 36 38 40 42	: 5 : 1 : 1 : 1 : 2 : 2 : 2	: 220 : : : : : : : 2,530 : 5,760
14 16 18 20 22 24 26 28 30 32 34 36 38 40 48 48	:	: 220 : : : : : : : 2,530 : 5,760 : 9,780 :
14 16 18 20 22 24 26 28 30 32 34 36 38 40 42	: 5 : 1 : 1 : 1 : 2 : 2 : 2	: 220 : : : : : : : 2,530 : 5,760

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131E. 33E. L genid · Yellow Pine OYellow pine groups

Name of Plot:	Dalton Meadow		
Location: Nati	onal Forest Sierr	18.	
Τ.	7 S . R. 25 E	Sec. 7	
Description of 1	Boundaries:		
Acreage: 320		845 - Jih - A	
Period of Examin	nation: June 19, 1	917	
Examiner: J. M.	Miller and Ralph H	opping	
	DEM. SANS	Yellow Pine	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Color of the second of the second	d of Timber (MBM):	4.800 SP & Y	(Ft.B.M.)
Number of Trees (Extensive wor	Counted k - spotted):	8	
Number of Trees	Examined: Infested:	6	6,900
	Abandoned: In 1917	* 3	5,060
	Prior to 1917	16	15,700
	Total:	25	27,660
Resulting Factor			
Average diameter	- YP: 27.5"	SP (Itree)	- 4,050 ft.
Average B.M			

Name of Pl	ot: Dalton		
Location:	National Forest Sie	ra	
	T. 7 S R. 25 H	Sec	7
Description	n of Boundaries:		
,			
Acreage:	320		
Period of E	Xamination: Type 10		
Examiner:	xamination: June 19.	1917.	
	J. M. Miller & Ralph Ho	pping	
		Sugar Pine	SOKKAKOWAKA
approximate	Stand of Timber (MBM):	4,800 SP & YP	
LEXTENSI VE	rees Counted work - spotted):	none	
Number of Tr	ees Examined: Infested:	none	
	Abandoned: In 1917	none	
	Prior to 1917	1	4.050
	Total:	1	4,050
esulting Fa	ctor		

DIAMETER AND VOLUME OF TREES

DALTON MEADOW

Sugar Pine 12" 14 16 16 18 3 550 27,660	7:	DADION		
12" 14 16 16 18 2	Diameter	: Number of Trees	: :	Volume (board feet)
12" 14 16 16 18 2		Vellow Dine		
14 16 18 20 20 1 360 22 4 1 6 3890 26 21 4 1 700 28 30 1 1 28 30 1 1 28 30 30 1 1 28 34 1 1 1 1,760 36 36 2 40 37 20 40 1 3,700 Sugar Pine 12" 14 16 18 20 22 24 26 30 30 30 30 30 40 1 40 1 40 48 1 4,050	12"	: Tellow Pine		
16 18 20 20 1 20 1 380 22 4 1,620 24 6 3,290 26 1 700 28 3 3,180 30 1 1,280 32 34 1 1,760 36 2 4,000 38 3 7,200 40 1 3,700 Sugar Pine 12" 14 16 18 20 22 24 24 25 28 30 30 30 30 30 30 30 30 30 30 30 30 30		4		
18				
20 : 1				FFO
22				
24	22			380
26	2.4			7 900
28		. 1	*	0.290
30 : 1 1,280 32 : 1 1,760 36 : 2 4,000 38 : 3 7,200 40 : 1 3,700	28	. 3	*	3 180
32				
34	32			1.200
36			•	760
38			•	4 000
688 Total 25 27,660 Sugar Pine 12" 14 16 18 20 22 24 24 26 28 30 30 32 34 36 38 40 48 1 4,050	38	: 2	•	7 200
688 Total 25 27,660 Sugar Pine 12" 14 16 18 20 22 24 24 26 28 30 30 32 34 36 38 40 48 1 4,050				7 700
688 Total 25 27,660 Sugar Pine 12" 14 16 18 20 22 24 26 28 30 30 32 34 36 38 40 48 1 4.050				0.100
Total Sugar Pine Sugar Pi				
Total Sugar Pine Sugar Pi	12/1-2/15		-	
Total Sugar Pine Sugar Pi		:	7 1970	
Total Sugar Pine Sugar Pi	A SHAPE OF	:		
Total Sugar Pine Sugar Pi	ATTENDED TO	:		
Total Sugar Pine Sugar Pi	688	: 100		
Sugar Pine	Total	25	15	27,660
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 48 1 4,050				
14		:Sugar Pine		
14	THE STATE OF THE S		:	
16	12"			
18 : : : : : : : : : : : : : : : : : : :	14			
20	16	:		
22 : 24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40 : 48 1 4,050	18	•	:	
24 : 26 : 28 : 30 : 32 : 34 : 36 : 38 : 40 : 48 1 4,050	20		1	
26 : : : : : : : : : : : : : : : : : : :	22	:	:	
28 : : : : : : : : : : : : : : : : : : :	24	:	-	
30 : : : : : : : : : : : : : : : : : : :	26	4	:	
32 : : : : : : : : : : : : : : : : : : :	7.0	4	;	
34 : 36 : 38 : 40 : 4.050 : 4.050 : 38 : 38 : 38 : 38 : 38 : 38 : 38 : 3			1	
36 : 38 : 40 : 4.050 : 4.050 :	F7 A	•	:	
38 : 40 : 4.05			4 9	
40 48 : 1 : 4.050		•	:	
48 1 4.050		P	:	
			:	
	48		:	4.050
		•	:	
			:	
48 Total 1 4,050		•	:	
48 Total 1 4,050				
Total 1 4,050				
	40			
	48 Total	1		4.050

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Name of Plot: Sand and Whiskey	Creek	
Location: National Forest Sierr		
T. 6 & 7 S R. 23 &	24 B Sec.	
Description of Boundaries: Bounde and Rock Creek Projects, on the no	d on the east	by Chiquito
and Willow Creek watershed, on the	east by the N	orth Fork of
the San Joaquin River and on the s	outh by the Pe	ckinpaw and
Ellis Meadows road.		
Acreage: 24,500		
Period of Examination: May-June-Jul		1917.
Examiner: White & Friant Lumber C		
Approximate Stand of m.	Yellow Pine	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Approximate Stand of Timber (MBM):	266.500	(Ft.B.M.)
Number of Trees Counted (Extensive work - spotted):	none	
Number of Trees Examined: Infested:	341	375,100
Abandoned: In 1917	5.	
Prior to 1917		
Total:	341	375.100
esulting Factor		
Verage B.M 3 006 27 44		VEREN SERVICE

Sand and Whiskey	Creek	
nal Forest Sierra		
and 7 S. R. 23 & 24	E , Sec.	
oundaries: See she	et under yell	ow pine
0.		
tion: May, June,	July and Augus	st, 1917.
e & Friant Lumber Co	0.	
	Sugar Pine	(Ft. B.M.)
of Timber (MBM):	403.500	
ounted - spotted):	360	
xamined: Infested:	360	1,731,600
Abandoned: In 1917		
Prior to 1917	(m	
Total:	360	1,731,600
	aut nigen	
	and 7 S. R. 23 & 24 oundaries: See she ction: May, June, e & Friant Lumber Co ounted - spotted): xamined: Infested: Abandoned: In 1917 Prior to 1917	e & Friant Lumber Co. Sugar Pine of Timber (MBM): 403.500 ounted - spotted): 360 xamined: Infested: 360 Abandoned: In 1917 Prior to 1917

Name of Pl	ot: Rock Creek	E STEEL STATE		
Location:	National Forest	Sierr	8	
	T. 75 . R.	23 & 8	4 S, Sec.	
Descriptio	n of Boundaries:	Waters	hed of Rock	Creek
Acreage: _	5,920			
Period of	Examination: May a	nd June	. 1917.	
Examiner:	A. K. Wofford			
			Yellow Pine	(Ft.B.M.)
Ap:proximate	e Stand of Timber (1	WBM):	140.000 YP &	SP
Number of T (Extensive	rees Counted re work - spotted):			
Number of 1	rees Examined: Infested:		94	109,480
	Abandoned: In 1917		-	
	Prior to	1917		
	Total:		94	109,480
Resulting F	actor			
Average B.	M 1,165 ft.			

Name of Plot:	ROCK Creek		
Location: Natio	onal Forest Sierra		
T	7 S . R. 23 & 2	4 E , Sec.	
Description of I	Boundaries: Watersh	ed of Rock Cr	eek
Acreage: 5,920			
Period of Examin	ation: May and June	e, 1917.	
Examiner: A.	K. Wofford		
		Sugar Pine	(Ft.B.M.)
Approximate Stan	d of Timber (MBM):		&c
Number of Trees (Extensive wor	Counted k - spotted):		
Number of Trees 1	Examined: Infested:	19	59,470
	Abandoned: In 1917		•
	Prior to 1917	100	
	Total:	19	59,470
Resulting Factor			
Average dia	3 8.6"		
Average B.M			

Rock Creek

		m		***	(hooma foot)	
Diameter:	Number of	Trees	:	Volume	(board feet)	5-
	TY 3 3 - D'		9 152			
	Yellow Pine	Let you will be				
12" :			:			
14 :		1 1 2 5 5 5	:			
16 :			-			
18 :				The second		
20 ;			:			
22 :		24.7670	:			
24 :			;			7
26 :			: -			
28		- 70				
30 :		154 ME ET	1	3*		
32			:			-
UT.			:	9.0		
			:			
00			:			_
			- :-	10-14-1-1-1-1		
Service March			:			
	:		<u>:</u>	<u> </u>		
	•					
			:			
The state of the s			:			
	: No receive the second		:			
	Contract the same		13 34			
Total	:					
	C		- 31			
	:Sugar Pine					
12"			-			
	*					MCL S
14						
16			-			
18	. 0				490	
20					420	
22	: 1				310	10.5
24	: 2				810	
26	· · · · · · · · · · · · · · · · · · ·					0 0 0
20					7 440	- 1
30 32	: 1				1,440 1,130 1,870 1,730 2,780	
3 C	4				1.130	
34	: 1				1.870	
36					2 700	
38					6 690	
40	: 2				0.050	
42	: 1			02	2.880	
44	; 1				3.980	
46	: 2				8.460	10 - 1 -
58					16.740	
72			*		10.300	-1-00
	:					
726	:	The Table	3/2/4		59,470	
Total	: 19					

Name of Plot:	Blue Canyon		
Location: Nat	ional Forest Sierr	'8.	
Τ.	10 S R. 25 E	, Sec.	
Description of	Boundaries: Actual	control work	on Big Creek
watershed			
			4 7
Acreage: 12,6	800		
Period of Exam	ination: Spring cont:	rol work. 191	7
Examiner: Roy			J 80 FLE
Sales of the sales			
		Yellow Pine	Sixearx Program (Ft.B.M.)
Approximate St	and of Timber (MBM):	159,630	(Ft. D.M.)
Number of Tree (Extensive w	s Counted ork - spotted):	-	
Number of Tree	s Examined: Infested:	282	340,340
	Abandoned: In 1917		
	Prior to 1917		
	Total:	282	340,340
Resulting Facto	or		
Average dia	. 26 ¹¹		
Average B.M	. 1,382 ft.		

Name of Plot:	Blue Canyon		
Location: Natio	nal Forest Sier	ra	
T	.os , R. 25 E	. Sec.	
Description of B	oundaries: Actu	al control work	on
Big Creek wate	rshed.		
Acreage: 12,6	00		
Period of Examina	etion: Spring co	ntrol work. 191	
Examiner: Roy B	THE STATE OF THE PARTY OF THE P		
		Sugar Pine	(Ft.B.M.)
Approximate Stand	d of Timber (MBM)	8,616	
Number of Trees ((Extensive work	Counted : spotted):		
Number of Trees H	Examined: Infested:	5	23,330
	Abandoned: In 1917		
	Prior to 1917		
	Total:	5	23,330

Average dia. - 48"

Average B.M. - 4,666 ft.

Name of Plot: Chiquito Basin		
Location: National Forest Sierra		
T. 6 & 7 S . R. 23 & 24	Sec.	
Description of Boundaries: Waters	shed of Chiqui	to Creek.
Trees actually worked on the contr	col project	
	professional and	
Acreage: 13,600		
Period of Examination: May and Ju	me	
Examiner: Chester A. Jordan		
	Yellow Pine	(Tel D II)
Approximate Stand of Timber (MBM):	230,000 SP & YP	(Ft.B.M.)
Number of Trees Counted (Extensive work - spotted):	or or ir	
Number of Trees Examined: Infested:	494	533,222
Abandoned: In 1917		
Prior to 1917		
Total:	494	533,222
Resulting Factor		
Average B.M 1.080 ft.		

Name of Pr	or: oniquito basin		
Location:	National Forest Sierra		
	T. 6 & 7 S , R. 23 & 24	E , Sec.	
Descriptio	n of Boundaries: Watersh	ed of Chiquit	o Creek.
Trees ac	tually worked on the contr	ol project	
Acreage:	13,600		
Period of	Examination: May and June		
Examiner:	Chester A. Jordan		
		Sugar Pine	
Approximat	e Stand of Timber (MBM):	230,000 SI	P & YP
	Trees Counted ve work - spotted):		
Number of	Trees Examined: Infested:	32	52,590
	Abandoned: In 1917		
	Prior to 1917		
	Total:	32	52,590
Resulting]	Factor		
Average	dia 29.7"		
Average	B.M 1,081		

CHIQUITO

Diameter:	Number of Trees	: Volume (board feet)
Drame (81;	ummer or liegs	, volume (board 1000)
	Yellow Pine	
12" :	ICTIOW TIME	
14 :		·
16 :		
18		•
20 ;		
22 :		•
24		•
26 :		•
28 ;		•
30 :		
32 ;		
34 :		
C7.4		•
7 0		
38 :		
40 :		
Total :		
10001		
	Sugar Pine	
	Sugar Pine	
		40
12"	1	4 0
12" 14	1	: 50
12" 14 16	1 2	: 50 : 160
12" 14 16	1 1 2 1	: 50 : 160 : 130
12" 14 16 18 20	1 1 2 1 4	: 50 : 160 : 130
12" 14 16 18 20 22	1 2 2 1 4	: 50 : 160 : 130 : 2.220 : 310
12" 14 16 18 20 22 24	1 2 1 4 1 3	: 50 : 160 : 130 : 2.220 : 310
12" 14 16 18 20 22 24 26	1 2 2 1 4	: 50 160 : 130 : 2,220 : 310 : 960
12" 14 16 18 20 22 24 26 7 28	1 2 1 4 1 3 5	: 50 160 : 130 : 2.220 : 310 : 960 : 2.920
12" 14 16 18 20 22 24 26 28	1 2 1 4 1 3 5	: 50 : 160 : 130 : 2.220 : 310 : 960 : 2.920 :
12" 14 16 18 20 22 24 26 7 28 30 32	1 2 1 4 1 3	50 160 130 2.220 310 960 2.920
12" 14 16 18 20 22 24 26 28 30 32 34	1 1 2 1 4 1 3 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36	1 2 1 4 1 3 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 48	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 48 54	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 48 54	1 1 2 1 4 1 3 5	50 160 130 2.220 310 960 2.920 2.780 2.400 3.400 3.4900 2.880 9.390 6.530
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 48 54	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 48 54 68	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400
12" 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 48 54	1 2 1 4 1 3 5 5	50 160 130 2.220 310 960 2.920 2.780 2.400

June 12, 1917.

OF THE PINE TRABER IN CALIFORNIA.

1. surpese.

The purpose of this survey is to determine how much infestation exists in the sugar and yellow pine stands of California, and the annual loss.

2. Object.

The object is to determine the cost of future work necessary to prevent this annual loss.

3. Area Proposed.

The White & Friant Lumber Company on March 1, 1917
addressed a letter to the pine owners of California proposing a
cooperative survey under the direction of the United States Department of Agriculture of the insect depredations in the merchantable
timber of this State. Copies of this letter were sent to the
United States Bureau of Entomology, the Porest Service and all
interested owners. Favorable replies have been received from a
number of timber owners representing holdings throughout the
pine belt of California. The grouping of the land owned by
companies who have agreed to support this survey is such that
it is now possible to organize a cooperative project to include
all the private and government owned pine timber on the western
slope of Sierra from the Rubicon river in Eldorade County south

as far as the Kern River. It will not be possible to organize a survey of northern California north of Eldorado County until more owners, including the large railroad grants, have agreed to cooperate. Such cooperation may be arranged so as to organize a project next season for this purpose.

4. Progedure.

This survey will be conducted by the Department of Agriculture under general supervision of the Bureau of Entomology and in cooperation with the Forest Service. The Bureau of Untomology will detail four trained men to conduct the field work of this project and the Forest Service will detail two men for the same purpose. The aslaries of the representatives of the Bureau of Entomology will be paid from funds appropriated for Forest Insect Investigations, and those of the Forest Service from funds appropriated for the protection of National Forests. The field axaminations expenses incurred in the examination of National Forest timber will be paid by the Forest Service, and of timber in the National Parks by the Department of the Interior. The field expenses incurred in the examination of privately owned timber will be paid by the owner, whenever cooperation can The tracts of large holders who refuse to cooperate be secured. will not be examined except incidentally. Small heldings below about 1400 acres in area will be covered at Government expense.

In order to secure the available funds to meet the expense of the field examinations it is proposed that both public and private owners advance an amount sufficient to cover extimated

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maple to cover all possible field expenses of this curvey on Matienal Forest and private lands. This amount will be prerated according to each sweet's per cent of the estimated total stand of pine timber on the area. An estimate of \$100.00 is considered sufficient for an examination of the Yesemite and Sequela Matienal Parks. In order to provide for the disburgement of these funds it is proposed that:

The Ferest Service provide a fund sufficient to cover the expenses in Matienel Forests and adjacent small tracts of timber and that this fund be disbursed by the District Fiscal Agent:

The Department of the Interior provide a fund for the National Park to be disbursed by the Supervisor of the Yosemite National Park:

A fund be subscribed by the private owners to be disbursed by their designated agent. For the present the white & Friant Lumber Company has effered to act as agent for the private owners:

The alletment of these funds will be considered sufficient guarantee of the good faith of the owners and the work will proceed without formal contact or agreements:

Only expenses actually incurred in the examination of a tract of timber will be charged against the owners' share of the fund and any unexpected balance will be refunded at the close of the field season. If operating companies defray these expenses by means of their own camps, transportation over their property and stage fares from railroad points, etc., no charge will be made against their assessment and the entire, or proportional, amount will be refunded.

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B. Estimates of Cost.

of \$2600.00 to cover the field expenses of the survey of the southern Sierra pine belt south of and including Elderade County. The timber stands quoted are from the best available figures, the percentages being based upon 2 25% reduction in the stand to allow for fir and cedar which need not be worked to central an infestation in pine.

Owner			Por cent: of whole: Lend :	Allotmont Required.
*West Side Lbr. Co. *Standard Lbr. Co. *California Boor Co. *Sanger Lbr. Co. *Yosemita Lbr. Co.	10,600,000: 1,520,000: 690,000: 586,000: 450,000:	7,950,000 1,140,000 520,000 440,000 340,000 1,130,000	48.3%	\$1.207.50 175.00 75.00 70.00 50.00 175.000
*Chas. E. Ruggles *C.A. Smith Thr. Co. *R. E. Dansher Co. *Madera Sugar PineCo. *Whiteside Lbr.Co. *Jas. Ducey	1,000,000: 1,410,000: 1,800,000: 320,000: 402,000: 826,000: 400,000:	750,000 1,060,000: 1,350,000: 240,000: 300,000: 300,000:	4.6 6.4 8.8 1.6 1.8 3.8 1.8	115.00 160.00 205.00 35.00 45.00 95.00 45.00
"Yosemite & Sequeia	No estimates: 420,000:	310,000:	1.9	100.00 47.50

^{*}Companies which have replied favorably to the White & Friant Company's

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mill not cooperate.

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6. General Plan of Field Work.

As a basis for the administration of the field work the area will be divided into the following 12 units:

No.of Unit		Extent of the Topo : graphic Unit.	Town from which most accessible
1.	C. A. Smith Timber Go. R. E. Danaher Co. Forest Service	All territory between the Rubicon and American Rivers.	Placerville, Eldorado Co., Calif.
2.	California Door Co. Porest Service	All territory between the American and Mokulmne Rivers	Placerville. Eldorado Co., Calif.
3.	Chas. E. Ruggles Forest Service	All territory between : H.Fork of Mokulumne & : the H.Fork of Stanislaus: Hivers	Sonora, Tuolumne Co., Ualif.
4.	Whiteside Lbr.Co. Jas. Ducey. Porest Service	All territory between : the N. Fork of the Stan-: islaus & the Middle Fork: of the Stanislaus River:	Sonors, Tuolumne Co., Calif.
5.	Standard Lbr.Co. Forest Service	All territory between : the Middle Fork of the : Stanisland and the M.Fk.: of the Tuelumne River :	Sonore, Tuolumme Co., Calif.
6.	:West Side Lbr.Co.	All territory from the N. Fork of the Tuolumne to the Tuolumne River	Sonora. Tuolumme Co., Calif.
7.	: Yosemite Lbr. Vo. : White & Friant : Lbr. Co. : Forest Service	All territory between the Tuolumne & Merced Rivers.	El Portal. Mariposa Co., Calif.
8.	Madera Sugar Pine Go. Porest Service	All territory from S.Fk. of the Merced River to the Crane Valley Reservoir.	North Fork, Madera Co., Calif.
9.	White & Frient Lbr.Co. Forest Service	All territory from Crane: Valley to the San Joaquin River	North Fork, Madera Co., Calif.

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Jo. of Unit	The state of the s	: Extent of the Topo-	
10.	Fresno Flume & Lbr.Co. Forest Service	: All territory from the San Jeaguin to the Kings River or Sierra-Sequoia Ferest Doundary	: Fresno Co., Galif.
11.	Sanger Lumber Co. Forest Service		Rume. Freeze Co Calif.
12.	Forest Service	: All territory from : the Forth Fork of the : Lawouh River to Korn : River & Finte Mt.	Tulars Co.

Field work will be stayed as soon as funds are available after June 1, 1917, and will be completed if possible by September 1, 1917.

A representative of the Bureau of Entemology or the Ferest Service will be assigned to make an examination and report upon each one of the 12 units into which the area has been divided. All agents, both of the Bureau of Entemology and of the Ferest Service, will be directly responsible to the Assistant Ferest Entemologist, who will not as superintendent of survey. The instructions issued for the examination of each unit and the methods used will be as uniform as pensible.

The cooperating owners will be notified by the Assistant Ferest Entemologist in regard to the probable period during which the exemination of their timber will be conducted. It is desired that if possible a representative of the owners take part in the examination. This will not only facilitate the work, but will enable the Agent of the Department and the owners of the timber to reach a better understanding in regard to actual conditions on the tract.

7. Reports.

Reports of the field examinations for each unit will be submitted to the Assistant Forest Entomologist, who will then submit a general report on the conditions and character of the infostation, with general recommendations and advice as to the character and amount of control work required to protect the timber from further serious lesses, or to bring about complete control. He will also make separate reports to the designated representative of the private owners, the District Forester and the Supervisor of the Mational Park. Copies of the reports of the field examinations will be submitted to the District Forester who will report upon the extent of the losses (including estimated amount of timber killed each year) from insect depredations, the availability of the infested timber, facilities for conducting the necessary work in accordance with recommendations of the Bureau of Entomology, general methods of procedure and estimates of cost.

The general report of the Assistant Forest Entomologist will be subject to the joint approval of the Chief of Branch of Forest Insects, the District Forester, the Supervisor of the

Yesemite Mational Park, and the designated representative of the private owners before it is submitted for final approval by the Chief of the Bureau and the Porester. When fully approved, copies will be distributed to all interested parties or published for general distribution.

The general report of the District Porester will be subject to the approval of the Bureau of Entemology, the Supervisor of the National Park and the designated representative of the private owners before it is approved by the Porester and distributed.

Separate reports and recommendations will be subject to the approval of Chief of the Branch of Forest Insects and that of the Chief of Bureau.

This Outline has been worked up jointly by Miller and Hopping and includes suggestions proposed by Dr. A. D. Hopkins. Forest Entomologist and Mr. W. A. Griffing, manager of the White and Friant Lumber Company.

INSTRUCTIONS FOR MEANINATION OF INDIVIDUAL UNITS ENTOMOLOGICAL SURVEY OF PINE TIMBER IN GALIFORNIA

1. Assignments.

Each of the 12 units into which the area has been divided will constitute an assignment of field work for one or more of the agents of the Bureau of Intomology or the Forest Service. These assignments will made as indicated in the following program which will be subject to revision according to the paggress of the work.

No.of	unit. Area	Cooperation	maniner	Period
1	: From the Rubicon ri			1
	; the south fork of t	he :R. S. Donaher Co.		
	: American river	:Forest Service		
2	; From the south fork	of ; Cal.Door CO.		
	; the American to the	north; Forest Service		
	i fork of the Mokulus	me rivers		
3	; rom the N. fork of t	the : Chas. L. Auggles	8	
	inokulumne to the N.	ork of: Forest Service		
11 960 39	of the Stanislaus ri	vers		
4	From the M.fork of t	he ; Whiteside Lor. C	Jo;	A STATE OF THE STATE OF
	Stanislaus to the mi	ddle Jas7Ducey		
5	fork of the Stanish	us Forest Service		
5	from the middle for	of the Standard Lbr. Co	3	
	Stanislaus to the N.	fork ; Forest ervice		
	of the Tuolumne rive	rs		
6	from the N. fork of t	he ; West Side Lbr. C	Co:	The state of a
	Tuolume to the Tuol	numme Forest Service		
	trivers			
7	; from the Tuolumne t	the :Yosemite Lbr. Co		
	Merced rivers	White & Friant		
		Forest Service		A CONTRACTOR
8	; foun the larged riv	er to : Madera Sugar Fi	lne	
	the N.fork of lille			
	1 and Crane Valley he	s. 1 Porest Service		
9		y Res.: white & Friant		
	to the San Joaquing			THE PARTY OF THE
		1 Forest Service		
10	; from the San Joaqui		AND REAL PROPERTY OF THE PROPE	
	: Kings Rivers	: Lbr.Co.		
Black I		: Forest Service		9078
11	: from Kings river to) :	E-E-Williams
	North fork of the			1
	i river			
12		of the: Porest Service		
Section Sec	Kaweah to Kern rive			A STATE OF THE STA
-				

2. Field Equipment

The following equipment will be required for the field work.

1 pocket compass

l cruising hatchet

l diameter tape

l pair field glasses

maps of area, including base map of 1 inch to the mile and U.S.Geological quanrangles if available.

section plats, 4 inches to the mile

individual tree record forms for recording data

1 marking pencil or crayon for recording number on trees 5. Method of conducting field work

The examination will be limited to the merchantable sugar pine and yellow pine belt on each unit. The entire part of the area which includes such stands will be examined by the sustem of general reconnicsance using as a base the Forest Service inch to the mile maps. The roads and trails will be traversed and detours made to prominent points and ridges so that the forest will be brought into view near enough to distinguish individual trees. This distance should not exceed two miles. The light conditions should be such that the estimator will view the timber with his habask toward the sun. The work should be so planned for each day that eastern exposures will be viewed in the morning and western exposures in the afternoon. Quite often the best lights for distinguishing faded trees will be before ten o'clock in the morning and after four o'clock in the afternoon. All watersheds where there are steep canyons or guiches should be spetted by riding the ridge on each side. The following data will be secured as a basis for estimates:

- a- Count total fading, sorrel and red standing trees without regard to year of death. Distinguish trees according to species. Spot all trees counted upon base map. Counting and spotting should be cons fined to merchantable trees, 18 inches and over in diameter. Notes should be kept on other insect damage such as Ips epidemics in pele stands, damage to tops, etc. All trees must be spotted on the map in the field.
- b- Examine all trees spotted which can be conveniently reached from the routes traveled. Record diameter, height, species of insect responsible for death, and other data indicated on record form.
- 6- Make an intensive cruise of approximately 1000 acres which have also be been examined under the system of general reconnaissance, and so selected as to represent as well as possible the character of the infestation within the unit. In this cruise all black-topped, red-top ed fading and infested trees should be recorded and mapped on the section plats and complete data taken on the record forms.
- d- Matimate the total number of trees on the area by taking the number of trees counted in general reconnaissance and multiplying by the factor for type of country seen, light and proximity of area. The following factors have been found to be fairly reliable in open forests.

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Very rough country. large areas hidden from view - - - - 3.5. The examiner will test these factors before using them and if necessary determine new ones if none of these can be used in the

type of country he is working

e-In heavy stands of timber or where the country is level and difficult to view it is not always practical to use the methods indicated. Under such conditions it will be necessary to run even strips through the forest and the percentage of the strip area to the total area will be taken as a basis for estimates.

f-Multiply total number of trees estimated by the ratio of old and new loss as determined by intensive cruise and tree records.

g-Determine average dismeters, heights and average board foot per tree from records of individual trees. Estimate old and recent loss upon the basis of the average board foot per tree.

-Reperts.

A report will be required for each unit by the agent who makes the examination. A general report will be required covering progress of work and general conditions including the following points:

a-Descriptive Bata

Location, acerage and character of stand, and natural topographic and the b-Cwnership and Cooperation Secured in Survey c-Methods of Field Work

a_Character of Infestation

Species of primary Insects, host trees, distribution, evidence

In addition to the general report the following records will chaimates

will be required:

e-Cepy of base map showing routes followed, approximate area covered by extensive reconnaissance, number and location of trees spotted. In spotting trees on the map a dot will be used to designatedinsectkilled yellow pine and a cross to designate insect-killed sugar pine. f-Cruising plats of areas which are cruised intensively, showing number and location officees recorded, records of trees and all data pretaining to loss on sample plots. Insteadesf locating sample plots by legal subdivicions a suitable local name should also be given them. ggEstirates of the following:

Potal number of red-topped, fading and serrel trees (insect-killed trees still retaining all or part of their foliage) separated

according to host trees.

Period of loss represented by this sestimate

Average diamter, and average board foot volume, according to host

Atres. infested

Number of/trees which will be found on area during control period of 1918.

* * * * * * * * * * * *

It is considered that trees counted in reconnaissance which still retain all or part of their foliage represent a period of less varying from 2 to 4 years. (an exception may be made of trees which still retain a few gray needles and which appear to he much older than this). The examinasr should estimate the extent of this period for each unit and also show whether he considers the infestation at present to be increasing, decreasing or stationary.

Trees will be distinguished to show wether they are still

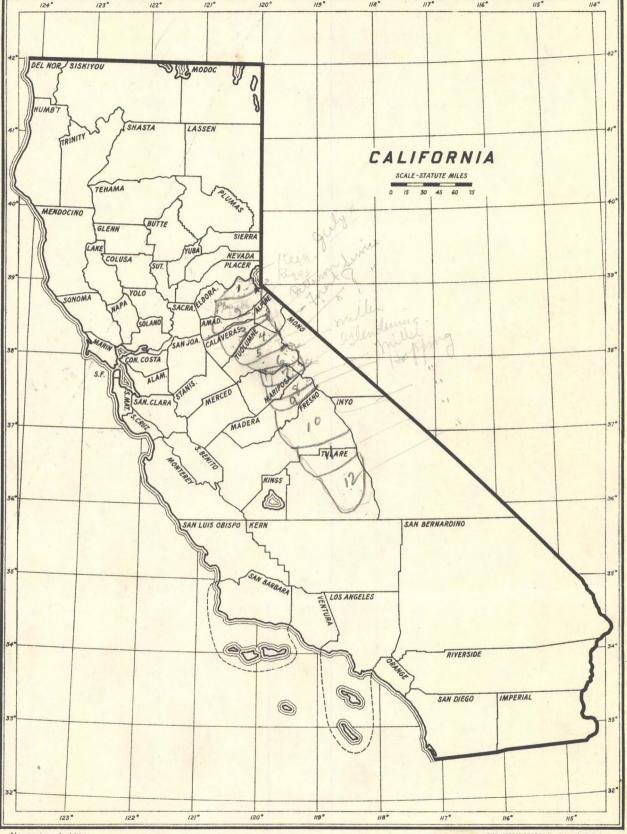
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infested or abandoned during the calender year of 1917. Less of previous years will not be separated. The perpertien of annual less on this basis will be estimated for the entire unit according to the data secured from the intensive plot and strip surveys upon which all insect-killed trees are recorded. Outside of the intensive cruising the dismeter, height and merchantable legs, and primary infesting insects should be recorded from as many trees as possible as a further basis for averages.

The data pretaining to loss on each unit should be separated so

far as possible according to ownership

Each assuminer will use consective numbers for individual tree records for the entire unit area .



November 1, 1914

THE NORRIS PETERS CU., WASHINGTON, D. C.

OUTLINE OF REPORT TO COOPERATORS.

- 1. Brief description of examination:
 - A. Name of examiner

B. Period of examination

- C. Nature of examination and limitations on accuracy of the data.
- 2. Insect losses as determined by the survey:

A. Amount of loss;

a. In the case of epidemic infestation, give loss

on a volume basis.

b. When the infestation is light, briefly describe its scattered nature and state that the infestation does not exceed a given volume or number of trees per section or unit area.

B. Distribution of loss.

- C. Primary insects responsible for loss and the condition of the infestation. (Include statement as to whether infestation is increasing, decreasing, or balanced.)
- D. Amount and condition of infestation in adjoining lands.
- 3. Significance of present infestation as affected by local conditions including:

A. Logging operations,

B. Maturity of stand,

C. Percentage of pine in stand,

D. Elevation, etc.

4. Recommendations:

A. Whether or not control work is desirable,

B. If desirable, the cooperation from adjoining lands

necessary for successful work,

C. Need for further examination in case control work is contemplated by owner, and the character of this examination.

Note: - Attached to this report should be an itemized statement of the cost of the survey to the cooperator.

September 24, 1917.

Data by Districts.*

D	i	8	t	70	i	C	+
-	-	Dec.	- 0	April 1	and the last	~	~

1. Location and extent of area included in the district;

A. Watersheds included.

B. Approximate total acreage of district,

C. Bames and approximate acreage of units involved in and subject to insect epidemics,

D. Extent of timbered area outside the above insect units which is not subject to insect epidemics because of such factors as elevation, timber types, etc.

2. Ownership;

- A. Approximate percentage of Forest Service, National Park, and private timber included in the District,
- B. List of the more important private holders in the District.
- 3. Description of the insect survey:
 - A. Character of cooperation from private timber owners,
 - B. Period of examination,

C. Name of examiner,

- D. Brief statement of itinerary, method of transportation, assistance from local Forest officers, suggestions for further examinations, etc.
- 4. Factors affecting division of the district into units;

A. Topographic factor.

a. Drainage (direction, manner in which drainage divides the district, presence or absence of definite drainage basins possible for acceptance as insect units.)

b. Presence or absence of high dividing ridges,

c. Range of elevations.

- B. Type factor presence or absence of type barriers and efficacy of these barriers in limiting infestation to definite units.
- 5. Character and commercial value of yellow pine and sugar pine, including,-

A. Percentage of stand (volume) which yellow pine and sugar pine forms, and the percentage of the other

species in mixture.

B. General thrift of yellow pine and sugar pine stands aside from insect attacks. (Include statement as to whether stand is young, mature or overmature.)

⁻ Each cooperator to be sent a copy of the report of the district which includes his holdings.

Description of infestation in the district;
 A. Yellow pine.

a. Primary insects involved.

b. Distribution of 1916-1917 infestation in the district.

c. Volume of loss, divided by ownership.

B. Sugar pine,

a. Primary insects involved.

b. Distribution of 1916-1917 infestation in the district,

c. Volume of loss according to ownership.

C. Location of present epidemic infestation in yellow pine and sugar pine, and portions of district where only light infestation now exists.

D. Evidences and location of past epidemics, and estimated amount of loss by them.

7. Control measures - units in the district in which control work seems desirable to prevent continuation of timber losses.

SUMMARY OF INSECT DATA

For District

Unit Name

Stand in M.B.M.

Loss by Insects in M.B.M. 1916 and 1917

Yellow Pine Sugar Pine

Yellow Pine Sugar Pine

Total:

September 24, 1917.

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GENERAL REPORT ON INSECT SURVEY.

- History of the survey, and its purpose.
- 2. Area, volume, ownership and values of timber involved.
- 3. Cooperation in the survey, and the organization of the work.

 (Include assignments and division of area into districts)
- *4. Methods of field work:
 - a. Method of general reconnaissance.
 - b. Data secured as a basis for estimates.
 - c. Limitations on accuracy of data.
- *5. Primary insects to be considered.
- *6. Factors determining units of infestation; (Include discussion of the areas outside the units.)
 - a. Character of epidemics.
 - b. Topography,
 - c. Type,
 - d. Elevations.
- *7. Distribution and character of infestation throughout survey area. (Include location of epidemics and status of infestation)
 - 8. Estimates of insect loss in yellow pine and sugar pine;
 - a. Distribution of loss,
 - b. Volume of loss in yellow pine,
 - c. Volume of loss in sugar pine,
 - d. Average size and quality of timber killed by insects: (Especially important in connection with sugar pine loss.)
 - 9. Necessity of control measures to prevent further losses in commercial timber, and the approximate cost of the application of these measures. (Consider here the treating of complete units. The number of infested trees to be cut should be estimated to equal at least one half the 1916-1917 loss. The cost of the work should be on the basis of completing control in one year. A maximum and minimum cost should be given, the actual cost depending on the percentage of the infestation to be removed.

September 24, 1917.

Those sections marked by an asterisk are to be prepared by the Bureau of Entomology, the remainder by the Forest Service. A copy of the complete report is to be sent each cooperator.